MINERALOGICAL ABSTRACTS

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Notices of Books.

TUTTON (A. E. H.). *Crystalline form and chemical constitution.* London (Macmillan & Co.), 1926, pp. xii + 252, 72 figs. Price 10*s.* 6*d.*

In style and format this volume would appear to be a new edition of the same author's 'Crystalline structure and chemical constitution' published in 1910 [Min. Mag., vol. 15, p. 332]. It is, however, based on a special course of lectures delivered at Cambridge in 1925; and it contains much new matter, especially in relation to the latest developments in crystallography by X-ray methods. Some of this new matter has already been given in the same author's exhaustive treatise on crystallography [Abstr., vol. 1, p. 297], and in his more recent 'Natural history of crystals' [Abstr., vol. 2, p. 241]. As before, the author's own work on the isomorphous relations of the double sulphates is not overlooked; and descriptions and figures are repeated of the elaborate pieces of apparatus that he has devised. Some of the latter (e.g. the elasmometer, universal interferometer, and torsometer) appear to have little direct connexion with the subject in hand. The book is well printed and illustrated, and it gives a very clear and readable account of the subject. It should be seen by all students of chemistry as well as those of crystallography. L. J. S.

HATCH (F. H.). *The petrology of the igneous rocks.* 8th edit., revised with the assistance of A. K. WELLS. London (G. Allen & Unwin), 1926, xxiv + 566 pp., 144 figs. Price 15*s.*

The seventh edition, published in 1914, of this well-known text-book has been completely revised and many modifications in classification and nomenclature have been introduced. The data for classification are discussed in a new chapter. Dr. Hatch's tabulated scheme of classification is retained, and the 'families' of this classification are further subdivided into saturated, over-saturated, and under-saturated rocks, in the sense of Shand and Holmes. This arrangement applied, for example, to the soda-syenites gives the three following groups: over-saturated soda-

syenites—Nordmarken type (nordmarkite), Åker type (åkerite); saturated soda-syenites—Laurvik type, Pulaski type; under-saturated soda-syenites—nepheline-syenites, nepheline-sodalite-syenites (Ditró, Laurdal, and Miask types), and analcite-syenites. The authors have avoided using unnecessarily rock-names founded on place-names such as ditroite, laurdalite, &c. Teschenites, and the ultra-basic rocks, perknites, picrites, and peridotites, grouped in the last edition with hypabyssal rocks, are now placed with the plutonic rocks. Anorthosites are described in a short section on monomineralic rocks. The volcanic rocks are described immediately after the plutonics, an arrangement which facilitates comparisons with their plutonic equivalents. Trachybasalts (in part, trachydolerite of Rosenbusch) are given a place in the classification as the volcanic equivalent of the kentallenite family. The felspathoid-bearing lavas are grouped together in an alkali-basalt family and are treated rather briefly. Following a recommendation of the Committee on British Petrographic Nomenclature, the authors have replaced the name nepheline-basalt by olivine-nephelinite, and leucite-basalt by olivine-leucitite. The treatment of the hypabyssal rocks involves some drastic changes of nomenclature. The rocks are divided as in the earlier edition into 'differentiated' and 'undifferentiated'. The latter are classified according to their plutonic equivalents. Texture (micro-structure) is applied to form subdivisions: micro-, crypto-, and hyalo- being used as prefixes; -porphyry, -granophyre, and -glass as suffixes. Granophyre used in this way ceases to have any compositional significance; markfieldite is diorite-granophyre, and quartz-dolerite is dolerite-granophyre. Felsite is replaced by 'cryptogranite'. Granite-porphyry is adopted to include quartz-porphyry and all porphyries of granitic composition. Porphyrite disappears from the nomenclature and is replaced by diorite-porphyry qualified by prefixing the name of the mineral forming the phenocrysts. Five hundred names of igneous rocks are given in an index which states the author of the name, the date, and a brief indication of the meaning of the name. There is a also a very useful index of localities. The last part of the book has been entirely re-written and opens with a chapter on petrographic provinces. The three chapters of the last edition on the distribution of igneous rocks have been recast into a single chapter on 'Cycles of igneous activity in the British Isles', which is admirably written. 'Derbyshire' on p. 514 is a misprint for 'Devonshire'. Another new chapter is one on the 'Consolidation of magma' in Part III of the book, which includes a review of some of the work of the Geophysical Laboratory at Washington. The book is well

printed and carefully edited. It should be very welcome, not only to lecturers and students, but to all interested in British Petrology.

W. C. S.

Whitlock (Herbert P.). *The story of the minerals.* The American Museum of Natural History, Handbook Series no. 12, New York, 1925, 144 pp., 1 pl., text-figs.

An interesting and popular introduction to the study of minerals includes chapters on: 'What is a mineral', 'Nature's mathematics' [i.e. crystallography], 'The mimicry of minerals', 'Water as a maker of minerals', and 'Change and decay in minerals'. This is followed by an account of the more common minerals (arranged under elements, oxides, carbonates, silicates, &c.), with special reference to the mineral collection in the American Museum of Natural History in New York. Here the larger and finer specimens have recently been displayed in the 'panels' of the wall-cases around the Morgan Memorial Hall of Minerals and Gems. A short chapter is given on the history of the collection, the most important acquisitions to which were the private collection of C. S. Bement in 1900, and the J. P. Morgan collection of gem-stones. Several excellent photographs of specimens in the collection are reproduced. The booklet should do much towards fostering the study of our subject.

L. J. S.

Ries (H.). *Economic geology.* Fifth edition. New York (John Wiley and Sons) and London (Chapman & Hall), 1925, v + 843 pp., 75 pls., 291 text-figs. Price 25*s.*

This book was originally planned to meet the requirements of students in the United States whose interests in minerals were supposed to be confined to North American occurrences. The first three editions of the book appeared under the title 'Economic Geology of the United States'. Judged from the point of view of a treatise on North American deposits it is an excellent book, very well illustrated, provided with numerous references, and altogether commendable. The title of the present edition, however, like that of the fourth edition, carries a general significance, although the book is still almost entirely restricted to a description of North American occurrences. Deposits in other parts of the world receive very scant attention, and such statements as are made concerning them are often not only inadequate, but inaccurate and misleading. On p. 242 we are told that leucite has not been worked commercially as a source of potash, and no reference is made to the Italian leucite rocks. On p. 280, the phosphate deposits of North Africa are dismissed in six

lines, no mention being made of those of Morocco. Under barium minerals, there appears to be no mention of witherite, either in the index or any other part of the book, notwithstanding the fact that North American consumers appear to be keenly desirous of obtaining supplies of this very useful mineral. On p. 378 we find the statement that North and South Carolina and Brazil supply nearly the entire world's demand for monazite; while on the next page it is stated that there has been no production in the United States since 1910, the gas-mantle industry having been supplied by imports from Brazil; and not even the barest mention is made of Indian monazite. These instances of the author's treatment of deposits other than those of North America are fairly typical, and show that the book needs serious revision so far as deposits in other parts of the world are concerned. T. C.

Clarke (Frank Wigglesworth). *The Data of geochemistry.* Bull. U.S. Geol. Survey, 1924, no. 770, 5th edit., Washington (Govt. Printing Office), 841 pp. [Price $1.00.]

The first edition of this well-known bulletin was published in 1908, being followed by later editions in 1911, 1916, and 1920 [Abstr., vol. 1, p. 180]. The book has been revised for the present edition, which has ten pages more than the fourth edition. It gives a critical summary of what is known concerning the chemical geology of rocks and minerals, and serves as an excellent guide to the more important literature available on this subject. The data covered relate not only to ordinary rocks and rock-minerals, but also to coal, petroleum, and metallic ores. Chapters are given to the chemical elements, the atmosphere, lake and river waters, ocean waters, well and spring waters, saline residues, volcanic gases, and magmas. The data are set out tersely and accurately, and cover the subject of chemical geology fully enough to make this bulletin a most useful work of reference on geochemistry. T. C.

[Levinson-Lessing (F. Y.)] Левинсон-Лессинг (Ф. Ю.). Петрография. Часть первая (вводная). *Petrography.* Part I (Introduction). Ленинград (Научное Химико-Техническое Издательство, [Leningrad (Sci. Chem.-Techn. Publications)], 1925, 395 pp., 178 figs., 1 diagram.

The book is divided into two parts: general (pp. 1–146) and special (pp. 149–392). In the latter the rocks are grouped in three main divisions: igneous (pp. 189–295), sedimentary (pp. 296–336), and metamorphic (pp. 337–365). Mainly Russian examples are described, and

these are illustrated by many photomicrographs, most of which have been previously published in the works of the author and his pupils. The book is interestingly written, but it is not quite clear why it should be called the introductory portion, since detailed systematic descriptions are here given of various rocks. The diagram by V. N. Lodochnikov represents the chemical types of igneous rocks and is explained on pp. 371–374. P. N. C.

[Fersman (A. E.)] Ферсман (А. Е.). Драгоценные и цветные камни СССР. [*Precious and coloured stones of Russia.*] Ленинград (Идз. КЕПС) [Leningrad], 1925, Monograph 3, Russ. Acad. Sci., vol. 2, 386 pp., 9 maps, 21 text-figs.

The first volume of this comprehensive work on the precious stones of Russia appeared in 1922 [Abstr., vol. 2, p. 522]. The present volume deals with occurrences, and gives an account of the geology of the various districts where such stones are found. Particular attention is paid to the Urals and to Transbaikalia. The detailed account of the emerald mines in the Urals (pp. 123–228) includes the author's new observations; whilst that of Transbaikalia is largely based on the work of P. P. Sushchinsky and M. M. Tetyaev [Abstr., vol. 2, pp. 87–91]. Interesting also is the account given of new finds of precious stones in outer Mongolia (pp. 344–348), where the geological relations are very similar to those in Transbaikalia. Full bibliographies are given at the end of each section, and there are indexes of subjects, localities, and authors. For details, the work itself must be consulted. P. N. C.

[Vernadsky (V. I.)] Вернадский (В. И.). История минералов земной коры. [*History of minerals of the earth's crust.*] Leningrad, 1925, vol. 1, part 1, 208 pp.

This book gives much historical material and many references to the literature. The chapter headings are: I, Problems and scope of mineralogy. II, Literature of special branches of mineralogy. III, The earth's crust. IV, Some remarks on the character of chemical reactions in nature. V, Forms in which minerals are found in nature (this being dealt with in a detailed and special manner, pp. 78–166). VI, Chemical stability and physical-chemical properties of minerals. P. N. C.

Eckermann (Harry *von*). *Molecular proportions.* Uppsala (Almqvist & Wiksells Boktryckeri-A.-B.), 1925, 219 pp.

This handy and clearly printed little volume gives a series of tables to save the calculation of molecular proportions from the chemical analyses of rocks. The proportions are given to four places of decimals for every

0·01 % ranging for SiO_2 from 30 to 80 %, and for TiO_2 0–5 %. In all there are twenty-four such tables for the common oxides, including also ZrO_2, Cl, F, SO_3, CO_2, &c. The tables are based on the International Atomic Weights of 1911. A brief preface is repeated in four languages —Swedish, German, English, and French—and the rest is all figures.

L. J. S.

Geometrical Crystallography.

Weissenberg (K.). *Zusammenstellung von Druckfehlern und Unterlassungen in P. Niggli, „Geometrische Kristallographie des Diskontinuums."* Zeits. Krist., 1926, vol. 63, pp. 172–173.

A list of errors in Niggli's 'Geometrische Kristallographie des Diskontinuums', 1919 [Abstr., vol. 1, p. 357]. H. H.

Niggli (P.). *Bemerkungen zu der Nomenklatur der geometrischen Kristallographie des Diskontinuums.* Zeits. Krist., 1926, vol. 63, pp. 174–175.

A criticism of K. Weissenberg's use of the terms Gitter, Hauptgitter, Mikroinsel, Dynade, &c. [Abstr., vol. 3, p. 16]. H. H.

Haag (F.). *Die 17 regelmässigen Planteilungen und Punktsysteme.* Zeits. Krist., 1925, vol. 61, p. 339, 1 fig.

A comment on a paper by the author [Abstr., vol. 2, p. 150] showing that the 18 two-dimensional groups of movements there given should be reduced to 17. [Cf. Abstr., vol. 2, p. 367.] H. H.

Haag (F.). *Die pentagonale Anordnung von sich berührenden Kreisen in der Ebene.* Zeits. Krist., 1925, vol. 61, pp. 339–340, 1 fig.

The author gives a method of filling two-dimensional space with congruent pentagons of angles 120°, 90°, 120°, 90°, 120°, each circumscribed to a circle. H. H.

Haag (F.). *Die Planigone von Fedorow.* Zeits. Krist., 1926, vol. 63, pp. 179–186, 32 figs.

E. S. Federov introduced the notion of planigon in 1916 [Abstr., vol. 2, p. 150]. An account of his work is given. The planigon is a polygon formed by the perpendicular bisectors of the sides of polygons whose vertices are regular point-systems. H. H.

Borgström (L. H.). *Die geometrische Bedingung für die Entstehung von Kombinationen.* Zeits. Krist., 1925, vol. 62, pp. 1–12, 3 figs.

Two forms cannot coexist on a crystal unless either their faces are mutually perpendicular or the ratio of the distances of their faces from

the centre of the crystal lies between certain limits. These limits are worked out in detail for the forms most frequently occurring in nature.

H. H.

Nold (Aug.). *Über Kristallstruktur.* Zeits. Krist., 1925, vol. 62, pp. 127–137, 14 figs.

A tetrahedron being taken as the model of a carbon atom on account of its tetravalency, it is shown how such tetrahedra may be joined together at their corners to form an assemblage which represents the structure of the diamond. H. H.

Boldirew (A. K.). *Die vom Fedorow-Institut angenommene kristallographische Nomenklatur.* Zeits. Krist., 1925, vol. 62, pp. 145–150.

The Fedorov-Institute of crystallography initiated an inquiry into the possibility of combining Fedorov's and Groth's crystallographic phraseology into a standard nomenclature. Apart from Prof. Groth nearly all the scientists consulted were of Russian nationality. The result is a report recommending certain titles for the various crystallographic forms and for the 32 classes of crystalline symmetry. As an example of the latter may be taken the hexagonal system (including the trigonal):

Hexagonale Syngonie. (*a*) *Trigonale Hyposyngonie.* — Trigonal-pyramidal, trigonal-trapezohedrisch, ditrigonal-pyramidal, rhomboedrisch, dihexagonal-skalenoedrisch.

(*b*) *Hexagonale Hyposyngonie.*—Trigonal-dipyramidal, ditrigonal-dipyramidal, hexagonal-pyramidal, hexagonal-dipyramidal, hexagonal-trapezoedrisch, dihexagonal-pyramidal, dihexagonal-dipyramidal.

H. H.

Beckenkamp (J.). *1. Der Kristall als homogenes Polyeder. 2. Die 14 Raumgitter.* Würzburg (Fränkische Gesellschaftsdruckerei), [1925], 39 pp., 8 figs.

An historical and critical account of the method of obtaining geometrically the 32 crystal-classes and the 14 space-lattices. H. H.

Rogers (Austin F.). *Friedel's law of rational symmetric intercepts.* Amer. Min., 1925, vol. 10, pp. 181–187, 2 figs.

Attention is called to the importance of G. Friedel's contribution (in 1905) to the problem of the irrational trigonal axis of symmetry in crystallography, and many references are given to similar discussions by other authors. H. H.

Clays.

[Tvaldchrelidze (Aleksandre (A.)] თვალჭრელიძე (ალექსანდრე). თავის საბანი მიწა და ზოგიერთი მისი მოსაპოვარი ადგილი დასავლეთ საქართველოში. [Georgian, with French title on cover: *Terre à foulon et quelques gisements dans la Georgie.*] ტფილისის უნივერსიტეტის მოამბე (Bull. Univ. Tiflis), 1923, vol. 3, pp. 329–340.

Fuller's earth has long been known to the inhabitants of Georgia and is called 'tavis sabani midsa', which in Georgian means 'earth for washing the head'. Its occurrence at 53 localities in western Georgia (Imeretia and Guria) is noted. It forms beds with a thickness of some feet, or small nests and seams in sedimentary rocks of Jurassic, Cretaceous, and Tertiary age. The best deposits are those in the Jurassic and in the neighbourhood of volcanic rocks. There was intense volcanic activity in the Caucasus during that period, and without doubt the fuller's earth was derived from the volcanic products, particularly the ashes and tuffs containing amphibole and pyroxene. Several of the following analyses by the author are the mean of two, the material being dissolved in (1) hydrochloric acid and (2) nitric acid, the latter being the better. I, from Martvili village in Mingrelia. II, Snakva village, Racha. III, Skande, Sharopan district, 19 km. from the town of Kutais. IV–VI, Gumbri near Kutais; V, (also CO_2 1·88 %) from the deeper layers, and VI from the upper layers containing mixed quartz grains.

	SiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MgO.	CaO.	H_2O (at 110°).	H_2O (> 110°).	Total.
I.	49·22	16·61	2·46	0·44	4·22	3·77	16·12	6·46	99·40
II.	52·24	16·62	1·90	2·02	3·83	2·40	12·93	8·50	100·44
III.	50·98	17·44	2·07	0·69	2·32	2·29	15·29	7·45	99·53
IV.	51·04	19·10	3·11	0·34	0·95	2·69	15·08	7·03	99·34
V.	51·38	15·48	3·12	0·43	3·24	3·43	18·02	5·04	100·14
VI.	62·02	12·30	2·96		2·16	1·64	13·21	5·70	99·99

The dehydration curve shows a break at 110° and another between 300° and red-heat. The absorptive power, tested by decolorizing crude paraffin, is somewhat variable, but one part by weight of fuller's earth decolorizes about 40 parts of paraffin. Similar tests were also made with ordinary clay (after heating at 260°), powdered laumontite, gypsum (after heating at 110°), felspar, and calcite; here the absorption is rather less, one part of the material decolorizing about 30 parts of paraffin.

P. N. C.

[Iskyul (V.)] Искюль (В.). Об отношении каолинита к высоким температурам.—Isküll (Wold.). *Ueber die Beziehung des Kaolinits zu höheren Temperaturen.* Труды Государственного Исследовательского Керамического Института (Transactions of the Ceramic Research Institute of Leningrad), 1925, vol. 2, pp. 1–27 (German summary pp. 23–27).

Kaolins from three Russian localities were heated at various temperatures up to about 1400° C., and the products were repeatedly digested on the water-bath in a 10 % solution of KOH. The results of the analyses of the solutions and of the residues are tabulated, and from them the following scheme is deduced for the alteration of kaolin. $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O \rightarrow Al_2O_3 \cdot 2SiO_2$ (kaolin anhydride) $\rightarrow Al_2O_3 + 2SiO_2$ (dissociation) $\rightarrow Al_2O_3 \cdot SiO_2$ (fibrolite) $\rightarrow 3Al_2O_3 \cdot 2SiO_2$ (mullite). This result, deduced from analyses, is compared with the dehydration-curve and the heating-curve of Y. V. Samoilov. His point 500° corresponds with the formation of kaolin anhydride, 900° with the dissociation to $Al_2O_3 + SiO_2$, and the fall from 1000° to 940° to the formation of fibrolite. The temperature of the formation of mullite is not fixed. The author has previously shown that kaolin anhydride is completely dissolved in a 2 % HCl solution after four hours digestion on the water-bath; and by this means it can be separated from mica and other impurities. P. N. C.

Hojnos (Rezső). *A mátraderecskei kaolin.* [Translation :] Hojnos (R.). *Über den Kaolin von Mátraderecske.* Földtani Közlöny, Budapest, 1925, vol. 54 (for 1924), pp. 79–85 (Hung.), pp. 189–195 (Germ.), 1 fig. (map).

Kaolin occurs on the northern side of the Lahocza Mt., near Mátraderecske in com. Heves. It is the product of post-volcanic action on biotite-hornblende-andesite, pyroxene-andesite, and their various tuffs. In quantity and quality it is suitable for working commercially. Analysis by K. Emszt gave: SiO_2 68·04, Al_2O_3 21·93, Fe_2O_3 and FeO 0·25, MgO 0·23, CaO 1·15, Na_2O 3·59, H_2O 6·49. K. Z.

Bragg (*Sir* William), Shearer (G.), & Mellor (J. W.). *Notes on the crystalline structure of some china clays examined by the X-ray powder method.* Trans. Ceramic Soc. Stoke-on-Trent, 1923, vol. 22 (for 1922–23), pp. 105–110, 11 figs.

The X-ray spectra of china-clays suggest that they are mixtures with kaolinite as the main constituent. Kaolinite after heating at 700° appears to show no crystalline structure, but after heating at 900–1000° a new

crystalline substance is developed. The spectrum given by a porcelain containing fibrolite agrees with that of natural fibrolite. L. J. S.

Shearer (G.). *Results of an* X-*ray investigation of the crystalline nature of china clays, etc.* [Translation:] *Risultati di esperienze con raggi X sulla natura cristallina delle porcellaniche, ecc.* Trans. Ceramic Soc. Stoke-on-Trent, 1924, vol. 23 (for 1923–24), pp. 314–317 (Engl.), 318–321 (Ital.).

X-ray spectra were taken of (1) china-clay, (2) a mixture of 1 mol. china-clay + 1 mol. Al_2O_3, (3) 1 mol. china-clay + 2 Al_2O_3, (4) Al_2O_3, in each case after the material had been heated at 1200° and at 1700°; and (5) of natural fibrolite. China-clay after heating at 1200° and 1700° showed the same spectra as fibrolite, though there is a slight difference in the intensities of the lines; and no doubt the material consists mainly of fibrolite. (2) heated at 1200° and 1700° and (3) at 1200° show fibrolite with free alumina; but in (3) after heating at 1700° a new crystalline compound is indicated. L. J. S.

Mellor (J. W.). *Do fireclays contain halloysite or clayite?* Trans. Ceramic Soc. Stoke-on-Trent, 1917, vol. 16 (for 1916–17), pp. 73–84, 4 figs.

The heating (time-temperature) curves for kaolinite, fireclay, halloysite, silicic acid, allophane, pyrophyllite, and several other clay minerals are compared. The kaolinitic minerals with the composition $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$ include the crystalline optically positive kaolinite and optically negative nacrite, and the non-crystalline colloidal clayite (of J. W. Mellor, 1909). The heating-curve of kaolinite shows a terrace at 500° and a hump at 900°, that of clayite terraces at 150° and 500° and a hump at 900°, and that of halloysite only the points at 150° and 900°. Halloysite, allophane, montmorillonite, &c., are regarded as colloidal mixtures $x\,Al_2O_3 \cdot y\,SiO_2 \cdot z\,H_2O$. A fourth group of hydrated alumina-silica minerals is represented by pyrophyllite. The main constituent of the fireclay of Glenboig, Lanarkshire, is clayite, and not halloysite as concluded by J. W. Gregory and D. P. McDonald in 1910; and the same is true of most other fireclays and ball-clays. L. J. S.

Mellor (J. W.) & Scott (A.). *The action of heat on kaolinite and other clays.—I.* [Translation:] *L'azione del calore sulla caolinite I.* Trans. Ceramic Soc. Stoke-on-Trent, 1924, vol. 23 (for 1923–24), pp. 322–329 (Engl.), pp. 330–337 (Ital.).

From a review and criticism of the literature, it is concluded that the dehydration of kaolinite does not take place at a definite temperature;

that dehydration is complete at just over 500°, and that the residue consists of a mixture of free silica and alumina [cf. Abstr., vol. 3, p. 15]. Another point on the heating-curve at about 900° is probably connected with the crystallization of the free alumina. Kaolinite and mixtures of kaolinite and alumina when heated at temperatures between 1200° and 1700° yielded fibrolite at the lower temperature, and at the higher temperature the compound $3Al_2O_3 . 2SiO_2$ (mullite). L. J. S.

Mellor (J. W.). *The discovery of china-clay in Europe.* Trans. Ceramic Soc. Stoke-on-Trent, 1924, vol. 23 (for 1923–24), pp. 179–181.

Historical notes on the discovery of workable deposits of china-clay at Aue in Saxony in 1709, at St. Yrieix near Limoges in France in 1765, and at St. Stephen near St. Austell in Cornwall in 1768. L. J. S.

Mellor (J. W.). *On the plasticity of clays.* Trans. Ceramic Soc. Stoke-on-Trent, 1921, vol. 21 (for 1921–22), pp. 91–103, 5 figs.; Trans. Faraday Soc. London, 1922, vol. 17, pp. 354–363, 4 figs.

A general review and discussion on the definition, mechanical and physical analysis, and measurement of plasticity, and its relation to colloidal matter, size of particles, flocculation and de-flocculation of clay. Attempts to isolate the colloidal matter of clay, by collecting from water the fine suspension, yielded from Cornish china-clay 0·005 % and from Devonshire ball-clay 0·05 % of a horny mass resembling glue, the finest particles of which are invisible under a $\frac{1}{12}$-inch objective. L. J. S.

Mellor (J. W.), Sinclair (N.), & Devereux (P. S.). *The de-hydration of dried clays.* Trans. Ceramic Soc. Stoke-on-Trent, 1921, vol. 21 (for 1921–22), pp. 104–106, 1 fig.; Trans. Faraday Soc. London, 1922, vol. 17, pp. 363–365, 1 fig.

The loss of water from kaolinite, china-clay, ball-clay, halloysite, &c., at 25° over sulphuric acid of different concentrations was determined. The loss is slow, amounting in crystallized kaolinite over 90 % H_2SO_4 to 0·46 %, and in different samples of 'halloysite' from 2·58 to 11·84 %. In a moist atmosphere water is slowly re-absorbed. L. J. S.

Samoiloff (J. V.) [1870–1925]. *The dehydration of kaolinite.* Trans. Ceramic Soc. Stoke-on-Trent, 1924, vol. 23 (for 1923–24), pp. 338–339.

A brief account of the author's work, published in Russian in 1909 and 1914, on the heating-curves of kaolinite and other aluminous minerals. He concluded that the product of dehydration of kaolinite is a mixture of Al_2SiO_5 and SiO_2, and that the exothermal reaction about 900° is due to a molecular rearrangement of the Al_2SiO . L. J. S.

Vernadsky (W.). *The action of heat on kaolinite and kaolinitic clays.* Trans. Ceramic Soc. Stoke-on-Trent, 1925, vol. 24 (for 1924–25), pp. 13–22. [Cf. Abstr., vol. 3, p. 15.]

One molecule of water in kaolinite is replaceable by bases and the other is zeolitic water, being held in the spaces of the crystalline structure. The formula is therefore written as a complex alumosilicic acid, $Al_2Si_2O_6(HO)_2 . H_2O$. Before the whole of the zeolitic water is lost, there commences the change at 450–460° C. to 'anhydrous leverrierite' $Al_2Si_2O_7$, which is complete below 600°. At 900–1060° this breaks down into Al_2SiO_5 (fibrolite) + SiO_2, and at 1200–1800° there is a further separation of silica with the formation of mullite $4Al_2O_3 . 3SiO_2$ or $3Al_2O_3 . 2SiO_2$ (the former being the formula deduced by the author in 1891). At still higher temperatures (1800–1920°) corundum is formed. These changes are expressed by structural formulae. A discussion (pp. 21–22) contains a criticism by N. L. Bowen and J. W. Greig. L. J. S.

Spence (Hugh S.). *Bentonite*, Dept. Mines, Canada, Mines Branch, 1924, no. 626, 36 pp., 9 pls., 2 text-figs.

A clay similar to the bentonite of W. C. Knight, 1898 [Min. Mag. vol. 12, p. 380], is of wide distribution in Manitoba, Saskatchewan, Alberta, and British Columbia, and in the western United States. It forms beds from a few inches to ten feet in thickness in Upper Cretaceous and Lower Tertiary strata, and has probably been formed by the alteration of volcanic ash. The dry material shows a sub-conchoidal fracture and is somewhat brittle. The colour ranges from cream to olive-green. One gram of material absorbs 1·53–4·95 grams of water, increasing 5–13 times in volume, and becoming very sticky ('hyper-plastic'). The sp. gr. of material dried at 105° C. ranges from 2·44 to 2·78. Melting-point 1330–1430° C., refr. index 1·547–1·557. Seven analyses by A. Sadler of Canadian bentonites show ranges: SiO_2 54·88–69·70, Al_2O_3 12·10–19·92, Fe_2O_3 1·79–4·10, MgO 1·75–2·83, CaO 1·56–2·22, Na_2O 0·48–2·00, H_2O at 105° 3·92–8·10, H_2O above 105° 3·24–4·92, with fractional percentages of FeO, TiO_2, P_2O_5, K_2O, S, SO_3, CO_2, C. Many and varied practical uses have been suggested for bentonite, and quite a number of trade-names ending in *ite* have been applied to it. A detailed bibliography is appended. L. J. S.

Ross (Clarence S.) & Shannon (Earl V.). *The minerals of bentonite and related clays and their physical properties.* Journ. Amer. Ceramic Soc., 1926, vol. 9, pp. 77–96, 2 figs.

The widely distributed clay known as bentonite is a rock that has

resulted by the alteration of glassy volcanic ash or tuff. Micro-sections show the original structures. It is composed largely of the mineral montmorillonite, or rarely of beidellite [Abstr., vol. 3, p. 8], with variable amounts of crystal grains of volcanic origin and admixed sand. These clay minerals are completely crystalline with micaceous habit and perfect cleavage, and the large surface they present accounts for the remarkable adsorptive properties of bentonite, rather than a 'colloidal' nature. The mean optical data for montmorillonite are α 1·493, β and γ 1·516, 2V15–25°. Many analyses are given of material separated by suspension in water from bentonite from various localities. These give the formula $(Mg,Ca)O . Al_2O_3 . 5SiO_2 . nH_2O$, where n is 5 to 7, varying with the humidity of the atmosphere. A large part of the is lost at 120° C., or in a desiccator, and re-absorbed in a moist atmosphere. The above formula for montmorillonite is confirmed by a new analysis of the original montmorillonite from Montmorillon, France, which gave on air-dried material: SiO_2 48·60, Al_2O_3 20·03, Fe_2O_3 1·25, CaO 1·72, MgO 5·24, MnO 0·16, H_2O 21·52 = 98·52. Analyses are also given of montmorillonite from a lithium-bearing pegmatite and from fuller's earth, and of beidellite ($Al_2O_3 . 3SiO_2 . nH_2O$) from bentonite. Another crystalline micaceous clay has the same composition, $Al_2O_3 . 2SiO_2 . nH_2O$, as the amorphous halloysite. L. J. S.

Joseph (Alfred Francis) & Hancock (John Stanley). *The composition and properties of clay.* Journ. Chem. Soc. London, 1924, vol. 125 (pt. 2), pp. 1888–1895.

Analyses are given of the finer portions (particles of less than 0·002 mm. diameter) separated from clays of various types, including several soil-clays from Sudan. These show a ratio of SiO_2/Al_2O_3 ranging from 2·11 in the non-plastic china-clay from England to 7·67 in the highly plastic bentonite from Alberta, thus suggesting a relation between chemical composition and plasticity. Some other characters (moisture equivalent, chemical reactivity, &c.) which are perhaps related to plasticity were examined. L. J. S.

Rideal (Eric Keightley) & Thomas (William). *Adsorption and catalysis in fuller's earth.* Journ. (Trans.) Chem. Soc. London, 1922, vol. 121 (pt. 2), pp. 2119–2123.

Fuller's earth, from Surrey, Somerset, and Florida, fractionated in the elutriator showed finenesses in the ratio 2·25 : 2·13 : 1 respectively. This measure of the specific surface is approximately proportional to the adsorptive power for methylene-blue from aqueous solution. The

catalytic action of fuller's earth on the decomposition of hydrogen peroxide is not related to the specific surface or to the adsorptive power, but perhaps depends on the iron content of the earth. L. J. S.

Butler (G. Montague). *Clays of eastern Colorado.* Bull. Colorado Geol. Survey, 1915, no. 8, 353 pp., 3 pls., text-figs.

The composition, properties, classification, and various uses of clays are discussed, and a more detailed account is given of the methods employed in their investigation. A geological account of the sedimentary formations is followed by details of occurrence in each county (with a sketch map of each county). The results of the laboratory tests, that were specially made by the Survey on a large number of samples, are tabulated. L. J. S.

Economic Minerals and Ore-deposits.

[Yakhontov (N.) and others] Яхонтов (Н.) . . . Материалы к изучению русского графита. [*Materials to the knowledge of Russian graphite.*] Материалы для изучения Ест. Произв. Сил СССР [Materials for a knowledge of the natural productive forces SSSR], Leningrad, 1925, no. 55, 137 pp., 10 figs.

A collection of papers by six authors dealing with Russian graphite from various economic and scientific points of view. An account is given of the deposit at Turukhansk in Yeniseisk and of the Aliber mine in Irkutsk. A petrographical account of the Aliber deposit by B. M. Kupletsky (Б. М. Куплетский) (pp. 41–90) gives detailed descriptions of the various types of nepheline-syenite, syenite, and diorite, with two new chemical analyses and several micrometric analyses. The author considers that the graphite in the nepheline-syenite is of pneumatolytic-contact origin; having been formed from hydrocarbons which resulted by the interaction of magmatic gases on the carbon dioxide liberated from the limestones at the contact when wollastonite was formed. The graphite forms large (some cubic metres) nests in the nepheline-syenite, and is penetrated by veins (1–8 cm. thick) of nepheline-syenite and less frequently by aggregates of microcline with smaller amounts of biotite, pyroxene, and sphene. These veins are bordered by platy crystalline selvages of graphite, and near them there are drop-like forms of graphite embedded in the compact graphite. These drops can be readily isolated, and they consist in the interior of crystalline scales of graphite. The outer separations of graphite contain calcite, orthoclase, and apatite. Minerals present in the nepheline-syenite of

Mt. Botogol include: microcline, nepheline, pyroxene, graphite, calcite, cancrinite, biotite, orthoclase, sphene, muscovite, sodalite, apatite, magnetite, pyrrhotine, pyrite, limonite, zircon, fluorite, chalcopyrite, blende, haematite; and as microscopic constituents oligoclase, andesine, aegirine-augite, diallage, brown hornblende, tourmaline, idocrase, and scapolite. Contact-minerals include: wollastonite, calcite, garnet, prehnite [Abstr., p. 86], diopside, and microscopic tourmaline and idocrase. Zircon is of different habits: prismatic (110), with (100), (111), (311), and (331); pyramidal (111), sometimes with (331) and small (100) and (110). Dark-grey garnet gave on analysis by L. Kaufmann: SiO_2 36·56, TiO_2 4·10, Al_2O_3 10·05, $Fe_2O_3 + FeO$ 17·69, CaO 32·30 = 100·70. Pyrrhotine forms tabular (0001) crystals up to $\frac{1}{2}$ cm. across, with $m(10\bar{1}0)$, and small $s(10\bar{1}1)$ and $u(40\bar{4}1)$; the best crystals being usually embedded in calcite. P. N. C.

Wagner (Percy A.). *Notes on the platinum deposits of the Bushveld igneous complex.* Trans. Geol. Soc. S. Africa, 1926, vol. 28 (for 1925), pp. 83–133, 4 pls., 6 text-figs.

Platinum metals have now been found at many localities on the outcrop of the Bushveld norite, the extreme points being nearly 400 miles apart. The economically important deposits are confined to those parts of the norite zone which are highly differentiated. The deposits are classified as follows: *A*, deposits formed by direct segregation from the norite magma; *B*, contact-deposits in metamorphosed dolomite or banded ironstone underlying the norite sheet. Group *A* is further divided into I, hortonolite-dunite deposits; II, chromitite deposits; III, deposits associated with disseminated sulphides in norite. Subgroup III falls into seven smaller groups, according to the particular type of norite or pyroxenite in which the metal is found. It was formerly assumed (cf. Abstr., vol. 2, p. 440) that the dunite formed a definite horizon in the norite, but now it appears that the dunite occupies pipes and veins. The best-known occurrence of the hortonolite-rock is a parsnip-shaped body within a larger body of magnesian olivine-rock of unknown size and shape. At a depth of 200 feet, the hortonolite-rock still assayed 23 dwts. per ton, but the magnesian rock carries only a trace of platinum. The highest assay yet recorded gave 137·8 dwts. per short ton. Other bodies of hortonolite-rock form segregations within diallage-pegmatite, but these have a low platinum content. Since phlogopite and hornblende accompany the hortonolite in the first case, but not in the second, it is suggested that solutions

containing fluorine effected the concentration of the platinum metals. Much new information is given about the important 'Merensky reef', which is a pyroxene-rich norite carrying irregular specks of pyrrhotine, pentlandite, and chalcopyrite, as well as some hornblende and biotite. The sulphides are held to be primary constituents of the norite, and a definite relation has been established between the proportion of sulphides and the platinum content of the rock. The contact-deposits in the Potgietersrust district are in lime-silicate rocks, formed by metamorphism of the Dolomite formation where it comes into contact with the norite. The values range from 4 to 10 dwts. per ton.

S. J. S.

Lightfoot (B.). *Platinum in Southern Rhodesia.* S. Rhodesia Geol. Survey, 1926, Short Report no. 19, 13 pp., 2 maps, 6 text-figs.

Platinum has recently been found in three areas on the Great Dyke, and the discovery has drawn renewed attention to the study of the latter. It has now been proved that the norite and the ultrabasic members of the dike form a series of 'large discontinuous cakes, each of which has a gentle synclinal structure'. The predominant rocks are felspar-rich norite, pyroxenite, serpentine, harzburgite. The pyroxenite is the country-rock of the platinum 'reef', which is a zone of dark, mottled norite, generally showing green copper stains, agreeing very closely in appearance with the 'Merensky reef' of the Lydenburg field, Transvaal. The platinum content ranges from a trace to 3 dwts. per ton; the highest assay recorded so far gave 1 oz. per ton. The distribution of platinum is related to that of the iron and copper sulphides in the rock, but the metal is so finely divided that only a trace can be recovered by panning. S. J. S.

Hess (Frank L.). *Platinum near Centennial, Wyoming.* Bull. U.S. Geol. Survey, 1926, no. 780–c, pp. 127–135, 1 fig. (map).

The rocks of Centennial Range in Albany Co. consist of biotite-felspar-schist and hornblende-schist with intrusive granodiorite and amphibolite. These carry gold veins and small amounts of sulphide ores. Assays of the rocks show small amounts of platinum metals, but not sufficient to justify working. L. J. S.

Luković (M. T.). *Note on the manganese and iron-ore deposits near Gradsko in Macedonia.* Ann. Géol. Pénins. Balkan. Beograd, 1925, vol. 8, pp. 136–139, 1 fig. (map).

Describes metasomatic deposits of iron and manganese oxides in the form of large lenses in calc-schists and marble in the valley of the

Vardar, Serbia. The composition of the ore ranges from Fe 63·89, Mn 0·98 to Fe 4·00, Mn 61·72 % from north to south of the area.

W. C. S.

Emszt (Kálmán). *Jelentés a m. kir. Földtani Intézet chemiai laboratoriumának 1919–1923 évi működéséről.* [Report from the chemical laboratory of the Hungarian Geological Survey for the years 1919–1923.] A Magyar Kir. Földtani Intézet évi Jelentése, Budapest, 1925, for 1920–1923, pp. 140–150. [Cf. Abstr., vol. 2, p. 463.]

Chemical analyses are given of mineral-waters from Co. Csík, iron-ores from Bagomér, and of fifty samples of bauxite from the Bihar Mountains. K. Z.

Cairnes (C. E.). *Nickeliferous mineral deposit, Emory Creek, Yale mining division, British Columbia.* Summary Report Geological Survey Canada, 1925, for 1924, part A, no. 2066, pp. 100A–105A, 3 pls.

The rocks of the locality consist of basic granodiorites in contact with pyroxenitic hornblendite. The relation between the two rocks seems to indicate that the latter and more basic rock is probably in the nature of a large dike intrusive in the more acid rocks. The nickeliferous deposit is in the basic intrusive. The primary ore-minerals, in order of abundance, are pyrrhotine, pentlandite, chalcopyrite, and magnetite. Secondary sulphide minerals, attributed to the action of supergene waters, are also present. One of these, secondary after pentlandite, is described as similar to 'bravoite' or 'nickel mineral X' [Abstr., vol. 2, p. 447]. A sample taken across a width of 45 feet showed Cu 0·58 % and Ni 1·67 %. The author attributes a magmatic origin to the primary ore-minerals, regarding them as genetically connected with the basic intrusive. T. C.

Bradley (Walter W.). *Magnesite in California.* Bull. California State Mining Bureau, 1925, no. 79, 147 pp., 11 pls., 62 text-figs.

This book gives a well-illustrated account of the magnesite deposits of California. An introduction deals briefly with the history of magnesite mining in this State; also various general aspects of the subject, including the properties and origin of the mineral, its industrial applications and uses, and the testing of oxychloride cements. The second and larger part of the book deals with Californian mines and their equipment, county by county. T. C.

Swanson (C. O.). *The genesis of the Texada Island magnetite deposits.* Summary Report Geol. Survey Canada, 1925, for 1924, part A, no. 2066, pp. 106A–144A, 5 figs.

The deposits (in British Columbia) referred to consist of lenticular masses of magnetite at the contact of quartz-diorite and limestone. Their formation is attributed to the action of magmatic solutions in which the materials were concentrated by the crystallization of the intrusive. It is thought that the assimilation of limestone by the magma may have played a part, iron oxides being thereby thrown out of the pyroxene molecule and made available for segregation as magnetite. The heterogeneous parts of the intrusive with its included blocks of limestone, and the tongues of limestone projecting into the stock, were especially suited to replacement, both physically and chemically, and contain the largest deposits. T. C.

Alley (E. N.). *Zonolite: utilizing a useless mineral.* Engin. Mining Journal-Press, New York, 1925, vol. 120, pp. 819–820, 2 figs.

A large deposit of a dark-brown altered phlogopite (vermiculite [jefferisite?]) occurs in the Kootenai valley near Libby, Montana. When heated it swells up to fifteen times its original volume forming a light flaky mass of golden-yellow scales. The roasted product is used under the name 'zonolite' as a packing material for heat insulation and in the manufacture of wall-paper. A commercial analysis of the roasted material gave SiO_2 42·8, Fe and Al oxides 26·2, CaO 1·9, MgO 24·6, alkalis 3·8, loss on ignition 0·7 %. [Cf. Abstr., vol. 3, p. 57.] L. J. S.

Rock-forming Minerals and Petrology.

Winchell (A. N.). *Studies in the felspar group.* Journ. Geol. Chicago, 1925, vol. 33, pp. 714–727, 6 figs.

The alkali-felspars $KAlSi_3O_8$–$NaAlSi_3O_8$ are believed to belong to three series: sanidine–barbierite, stable above 900° C.; adularia–albite; and microcline–analbite ('analbite' being a name suggested for anorthoclase containing less than 10 % $KAlSi_3O_8$). The available optical data are plotted against chemical composition for each of these series. A similar plot is given for the series $KAlSi_3O_8$–$CaAl_2Si_2O_8$, adularia–celsian. The plagioclase series $NaAlSi_3O_8$–$CaAl_2Si_2O_8$ is divided at every 10 % Ab and An into ten members for which some special names are devised. L. J. S.

Himmelbauer (A.). *Kristallographische Eigenschaften des Andesins von Trifail.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 610–623, 3 figs.

Small (1–2 mm.) crystals of andesine are found singly in coal [Tertiary lignite] and clay at Trifail, formerly in southern Styria [now in Yugoslavia]. They are clear and colourless, but enclose some brown glass. Analysis by N. Sahlbom gave SiO_2 57·30, Al_2O_3 26·87, Fe_2O_3 0·82, MnO trace, MgO 0·06, CaO 8·64, Na_2O 6·02, K_2O 0·62, H_2O at 105° 0·12, TiO_2, BaO nil = 100·45. Deducting impurities this corresponds with $Ab_{53\cdot7}$ $An_{42\cdot7}Or_{3\cdot6}$. Sp. gr. 2·675. Amongst 100 crystals, there were 47 simple crystals; 43 albite-twins, usually consisting of only two portions and rarely showing twin-lamellae; and 10 Carlsbad-twins. The simple crystals and the albite-twins are elongated along the *a*-axis and are rectangular in cross-section; whilst the Carlsbad-twins are elongated along the *c*-axis and flattened on (010). The forms present are *b c m f M z y e n* m *p o a* [Dana's letters]. Two-circle measurements made on nineteen crystals give the elements $a:b:c = 0{\cdot}6341:1:0{\cdot}5521$, $\alpha = 93°27'$, β 116°18′, γ 90°10′. Direct measurements of the angle (010):(001) gave 85°58′ to 86°7′ (calculated from the above elements 86°4′). These values, although lying between those for albite and anorthite, vary somewhat from previous values, the difference being perhaps due to the presence of the orthoclase molecule. L. J. S.

Dittler (E.) & Köhler (A.). *Experimentelle Untersuchungen über die Entmischbarkeit der Kali-Natronfeldspäte.* Anzeiger Akad. Wiss. Wien, Math.-naturwiss. Kl., 1925, vol. 61 (for 1924), pp. 101–102.

—— —— *Über das Verhalten der Feldspäte bei hohen Temperaturen.* Ibid., pp. 153–154.

—— —— *Zur Frage der Entmischbarkeit der Kali-Natronfeldspäte und über das Verhalten des Mikroklins bei hohen Temperaturen.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 229–261, 1 pl., 1 text-fig.

The formation of perthite by the breaking down of a homogeneous mixed crystal of felspar is discussed [Abstr., vol. 1, p. 279], and the possibility of reconstructing the homogeneous crystal is suggested by the X-ray experiments of S. Kôzu and Y. Endô [Abstr., vol. 1, p. 314]. Microperthite from various localities was heated for 500 hours at 1000° C., and it was then found that the albite lamellae had been absorbed (indicating diffusion in the solid) and a homogeneous crystal

produced. With the coarser perthite this change is only partial. Microcline so treated showed the disappearance of the cross-hatched structure, and the material then had the optical characters of orthoclase. Antiperthite (orthoclase lamellae in plagioclase) showed no change.

L. J. S.

[Byelyankin (D. S.) & Tomkyeev (S. I.)] Бѣлянкинъ (Д.) и Томкѣевъ (С.). О минералогическомъ составѣ сіенита изъ Плауена бл. Дрездена. [French résumé:] Beljankin (D.) et Tomkeieff (S.). *Sur la composition minéralogique de la syénite de Plauen (Plauenscher Grund) près Dresde.* Извѣст. Петроград. Политехн. Инст. Имп. Петра Великаго (Ann. Inst. Polytechn. Pierre le Grand, Petrograd), 1915, vol. 23, reprint 9 pp.

A microscopical study of the syenite of Plauen near Dresden shows that the soda-potash felspar is not orthoclase, as previously thought, but a microcline-perthite with 2V 68–86°. Analysis of this felspar gave SiO_2 61·56, Al_2O_3 21·40, CaO 1·51, Na_2O 2·39, K_2O 12·76, ign. 0·33 = 99·95. The mineralogical composition of the rock, as deduced from a micrometric analysis of thin sections, and also calculated from the analyses of the rock (H. S. Washington, 1906, and R. Nacken, 1914), of the hornblende (T. Horning, 1907), and of the felspar, gave: quartz 11, microcline 34, plagioclase 33, hornblende 17, magnetite, sphene, and apatite 5 %.

L. J. S.

Chudoba (Karl). *Die optische Orientierung des Albits von Rischuna, Schweiz.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 88–99, 2 pls.

Plates cut approximately normal to the two optic axes *A* and *B* were used to determine their exact positions, which are expressed as angular co-ordinates: for the *A*-axis, $\phi - 48°17'$, $\lambda + 63°47'$, and for the *B*-axis, $\phi - 47°13'$, $\lambda - 77°1'$. Extinction on (001) $+3°40'$, and on the poorer cleavage (010) $20°10'$. Sp. gr. 2·6256; α 1·5293, β 1·5334, γ 1·5397, $\gamma - \alpha$ 0·0104 (Na). [Cf. Abstr, vol. 1, p. 281, vol. 2, p. 435.]

L. J. S.

Zsivny (Victor). *Die chemische Zusammensetzung des Sanidins von Végardó.* Centralblatt Min., Abt. A, 1925, pp. 279–284.

Translation of a paper published in 1923 [Abstr., vol. 2, p. 223].

Jakob (Johann). *Beiträge zur chemischen Konstitution der Glimmer. II. Mitteilung: Die Muskovite der Pegmatite. I. Teil.* Zeits. Krist., 1925, vol. 62, pp. 443–453.

Ten analyses with optical data (but no densities) are given for muscovites from pegmatites. I, pale-rose muscovite, from Laufenburg, Switzerland; II (also F 0·57), yellowish, Otjimbojo, South-West Africa; III (also H_2O at 110° 0·02), yellowish, Claro, Ticino, Switzerland; IV, greenish, from Donkerhuk, South-West Africa; V, apple-green, Val Melera, Morobbia, Ticino; VI, light-grey, Bellinzona, Ticino; VII, yellowish, Monte di Daro, Bellinzona; VIII (also F 0·11), reddish-brown, Gaya, Bengal, India; IX, grey-white, Val Somvix, Grisons; X, greenish, Rossa, Val Calanca, Ticino. The last is high in silica and corresponds with phengite, although in occurring as large (5 cm.) plates it is not of the typical phengite habit. These analyses do not conform to any one general formula, and those provisionally adopted are on the same lines as in the author's previous paper [Abstr., vol. 2, p. 423]. For example, from anal. I $[Al(SiO_6SiO_2)_3]Al_5K_{1\cdot930}H_{1\cdot070}$, and from anal. X

$$29{\cdot}86\left[Al(SiO_6\,SiO_2)_3\right]\begin{matrix}Al_5\\K_{2\cdot583}\\H_{3\cdot418}\end{matrix}+34{\cdot}31\left[Al(Si_2O_5\,SiO_2)_3\right]\begin{matrix}Al_2\\K_{1\cdot291}\\H_{4\cdot087}\\Mg_{1\cdot811}\end{matrix}+35\left[Al(SiO_4\,SiO_2)_3\right]\begin{matrix}Al_2\\K_{1\cdot291}.\\H_{1\cdot709}\end{matrix}$$

It is asserted that these represent simple stoicheiometric ratios.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
SiO_2 ...	45·18	44·85	45·56	45·09	45·16	45·26	45·93	46·21	46·16	50·79
TiO_2 ...	0·26	trace	0·47	0·20	0·25	1·20	0·29	0·34	0·24	1·10
Al_2O_3 ...	36·62	36·95	35·78	34·32	33·69	32·77	33·45	38·10	35·63	26·53
Fe_2O_3 ...	2·76	1·54	1·92	3·31	4·44	3·85	2·68	1·97	1·60	2·94
FeO ...	nil	1·36	0·51	1·43	0·50	0·64	0·65	nil	1·63	1·34
MnO ...	trace	trace	0·11	0·07	trace	0·04	0·03	trace	trace	0·05
MgO ...	nil	nil	0·94	0·06	0·08	0·74	1·58	0·06	0·51	2·80
Na_2O ...	1·22	1·78	1·07	3·77	1·04	1·93	1·06	0·73	1·14	1·01
K_2O ...	9·48	9·13	10·03	8·10	9·37	10·42	9·88	8·98	9·74	9·71
H_2O ..	4·61	4·08	3·72	3·80	5·56	3·20	4·51	3·63	3·34	3·90
Total ...	100·13	99·69	100·13	100·15	100·09	100·05	100·06	100·02	99·99	100·17
α	1·557	1·553	1·544	1·560	1·557	1·557	1·542	1·553	1·556	1·556
β	1·593	1·584	1·592	1·593	1·594	1·594	1·594	1·592	1·597	1·599
γ	1·598	1·590	1·599	1·598	1·599	1·598	1·602	1·599	1·603	1·602
2V ..	41° 20′	46° 20′	41° 24′	41° 44′	40 30′	36° 10′	40° 8′	43° 20′	42° 0′	29° 20′
2E ...	68 26	77 0	68 34	69 18	67 0	59 22	66 20	72 0	69 48	47 48

L. J. S.

Eckermann (Harry *v.*). *Die Glimmermineralien im Mansjö-Kalkkontakt.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 277–287.

Detailed chemical analyses, with density and optical determinations,

are given of a biotite (I) and four phlogopites (II–V) collected from different points in the contact-zone of pegmatite intrusive into eulysite and limestone at Mansjö Mtn., Sweden [Abstr., vol. 1, p. 396]. The analyses give varying ratios, and no general formula is deduced. The results are discussed in connexion with the metamorphic reaction $Fe_3O_4 + CO \rightleftarrows 3FeO + CO_2$. The 'oxidation degree' (ratio Fe_2O_3/FeO) varies in the five analyses from 0·0425 to 6·9100.

	I.	II.	III.	IV.	V.
SiO_2... ...	34·03	40·95	40·80	40·47	39·41
TiO_2... ...	2·74	—	0·05	2·44	0·29
Al_2O_3 ...	18·46	13·14	13·16	14·66	13·44
Fe_2O_3 ...	2·01	0·85	1·84	2·42	2·27
FeO... ...	21·54	1·71	2·16	0·65	0·15
MgO ...	8·06	28·03	26·72	26·64	29·18
CaO	0·50	0·40	0·46	0·50	1·87
Na_2O... ...	0·34	0·96	2·44	0·67	0·58
K_2O	8·88	10·25	7·95	7·57	7·59
Li_2O... ...	0·04	—	nil	0·11	0·20
H_2O	3·29	2·06	2·95	2·09	2·33
F	0·25	3·15	2·89	2·44	1·55
Total ...	100·03	100·17	100·20	100·61	99·65*
Sp. gr. ...	3·085	2·831	2·819	2·869	2·737
α_{Na}	1·5887†	1·5400	1·5452	1·5506	1·5425
γ_{Na}	1·6311	1·5740	1·5795	1·5801	1·5750
$2V_{Na}$	11° 26′	3–6°	4° 30′	6° 20′	2–3°

* Including BaO 1·28, Cl 0·21. † β_{Na} 1·6305.

L. J. S.

Marchet (Arthur). *Über Hornblenden aus dem niederösterreichischen Waldviertel.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 494–507, 1 fig.

The hornblendes occurring as constituents of the crystalline schists, mostly amphibolites, of the Waldviertel in Lower Austria [Abstr., vol. 3, p. 39], are grouped as: (1) pale-coloured hornblendes with relatively low refraction (α' on (110) 1·641 to 1·653); (2) green hornblendes; and (3) brown hornblendes. Optical data determined for eighteen of these include the extinction-angle $c:\gamma$, optic axial angle $2V_a$, birefringence $\gamma - \alpha$, and refraction α' on (110); from these values the principal indices α, β, γ are calculated. Only two could be isolated satisfactorily for chemical analysis, these being green hornblendes from amphibolites. (From analysis I, 0·66 % sphene and 0·08 pyrite have been deducted; and from II, 2·06 % magnetite.) The composition of some others was

calculated from the analyses of the rocks. For the green hornblendes it is shown that with increasing ferrous oxide, and corresponding decrease of magnesia, there is an increase in refractive index and decrease in the optic axial angle. The brown hornblendes do not fall in this series.

	SiO_2.	TiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MnO.	MgO.	CaO.	Na_2O.	K_2O.	H_2O.
I.	42·80	1·59	11·31	4·13	14·61	0·17	8·81	13·88	1·11	1·08	0·51
II.	42·78	2·93	12·32	1·54	14·15	0·15	9·42	13·12	1·63	1·25	0·71

			I.	II.		Brown.	
α' on (110)	...	1·660	1·666	1·672	1·671	1·680	1·673	1·652
$2V_\alpha$	...	86°	78°	70°	66°	46½°	85¾°	87¼°
FeO	...	10·7	11·4	14·6	14·2	15·0	10.6	11·5
MgO	...	11·7	10·2	8·8	9·4	4·6	11·0	9·6

L. J. S.

Meigen (W.) & Nachreiner (Fr.). *Osannit von Alter Pedroso (Portugal)*. Centralblatt Min., Abt. A, 1925, pp. 327–330. [Cf. Abstr., vol. 2, p. 401.]

Osannite isolated from umptekite gave (mean of three analyses): SiO_2 47·57, TiO_2 0·55, Al_2O_3 0·03, Fe_2O_3 17·58, FeO 22·09, MnO 0·81, MgO 0·22. CaO 1·14, Na_2O 7·62, K_2O 1·15, H_2O (at 110°) 0·16, H_2O (over 110°) 1·12, total 100·04. This corresponds with riebeckite 46·1, arfvedsonite 17·6, actinolite 36·3 mol. %, with some water; and to the formula $H_{10}(Na,K)_{22}(Fe'',Mn,Mg,Ca)_{28}Fe'''_{18}(Si,Ti)_{64}O_{199}$. This analysis has already been published in A. Osann's fourth edition of Rosenbusch's 'Elemente der Gesteinslehre' (1923); where also is given an analysis of an osannite-hornblendite (called pedrosite) from Alter Pedroso, consisting almost wholly of osannite with very little magnetite.

L. J. S.

Brauns (Adele) & Brauns (R.). *Sillimanit, nicht Mullit, in den Gesteinen der Niederrheinischen Vulkangebiet.* Centralblatt Min., Abt. A, 1926, pp. 9–14.

Analyses of fibrolite in a pyrometamorphic schist from Laacher See and in basalt from Finkenberg agree closely with the formula $Al_2O_3 . SiO_2$, proving that the material is not mullite. The optical data alone are insufficient to distinguish between fibrolite and mullite; and it is suggested that 'mullite' may be a solid solution of alumina in fibrolite. The relations of fibrolite, kyanite, and andalusite are discussed.

L. J. S.

Fersman (A.). *Über die Genesis der Smaragdgruben im Ural.*—Ферсман (А. Е.). О происхождении Изумрудных копей на Урале. Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 57–60 (German).

The well-known emerald mines, 70 km. north-east of Ekaterinburg, are situated in a band of crystalline schists which are bounded on the west by granite and on the east by a dunite-pyroxenite massif. Pegmatite veins, consisting of albite or oligoclase with little quartz, traverse the schists and are bordered symmetrically by (1) a zone of biotite-schist, in which the best emeralds are found, (2) an actinolite zone with chlorite, passing outwards into (3) talc-rocks. There is thus evidence of the transfer of material; namely of Si, O, H, Li, Be, F, K, Al from the pegmatite, and of Ca, Mg, Fe, Cr, V, Mn, Ti from the surrounding rocks.

P. N. C.

Fersman (A.). *Über die migmatischen Pegmatite des Urals.*—Ферсман (А.). О мигматических пегматитах Урала. Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 69–72 (German).

Three types of pegmatites are distinguished: I, normal pegmatites; II, contact-pegmatites, where there has been some exchange of material with the surrounding rocks, e.g. plagioclase-pegmatites with tourmaline or cordierite; and III, migmatic pegmatites. In the last type the migration of material has been still more pronounced, especially in the removal of the volatile constituents (H, Li, B, K, Na, F, Cl, and also of S, P, Be, SiO_2, and Al_2O_3) from the pegmatite magma. An example is seen at the emerald mines [preceding abstract]. The desilicification [Abstr., vol. 1, p. 282] may proceed still farther with the production of basic plagioclase, corundum, margarite, &c., as in plumasite and marundite [Abstr., vol. 2, p. 80], examples of which are also seen in the Urals.

P. N. C.

[Samoilov (Y. V.) [1870–1925] & Zilbermintz (V. A.)] Самойлов (Я. В.) и Зильберминц (В. А.). О сероводороде в каменноугольных известняках Донецкого бассейна. [*On hydrogen sulphide in Carboniferous limestones of the Donetz basin.*] Труды Научно-Исследовательского Института Минералогии и Петрографии при Физико-Математическом Факультете 1. Мос. Гос. Унив. Москва, 1925, Вып. 1 [Trans. Sci. Research Inst. Min. Petr. Physico-Math. Faculty, First Moscow State Univ.], Moscow, 1925, no. 1, 31 pp.

Limestones were dissolved in hydrochloric acid and the amount of hydrogen sulphide evolved was estimated by the colour given to lead

acetate paper according to the scale: no. 1, yellowish-brown; no. 3, light brown, 0·001 % H_2S; no. 5 black, 0·011–0·012 % H_2S. Of 218 samples of Carboniferous limestones from the Donetz basin, only 21 gave a negative result, and 46, 58, 57, 34, and 2 corresponded with nos. 1–5 on the scale. The amount of hydrogen sulphide ranges with the colour of the rock, white-grey, light grey, dark grey, and black corresponding respectively with nos. 1–4 on the scale. [By using hydrochloric acid, some of the hydrogen sulphide may have come from sulphides; Abstr., vol. 2, p. 126] P. N. C.

[Tarasenko (V. E.)] Тарасенко (В. Е.). О некоторых кристаллических сланцах Криворожского рудоносного района. [*On some crystalline schists in the Krivoy-Rog ore-bearing district.*] Труды Воронежского Госуд. Университета—Acta Universitatis Voronegiensis (olim Jurievensis-Dorpatensis), Voronezh, 1925, vol. 1, pp. 265–289, German résumé pp. xii–xiii.

The rocks described from the Krivoy-Rog iron-ore district in Ukraine include: (1) Riebeckite-tremolite-schist from the Kandybina ravine.—This consists of riebeckite, tremolite, magnetite, haematite, quartz, calcite, limonite, and rarely garnet. Analysis I by N. Troitzky of the riebeckite-tremolite portion (which could not be separated owing to the intimate intergrowth) gives the formula $1Na_2Al_2Si_4O_{12} . 7Na_2Fe_2Si_4O_{12} . 13CaMg_2Si_4O_{12} . 2CaFe_3Si_4O_{12}$, with also $2CaSiO_3 . 6H_2O$ and $12SiO_2$ (this silica being probably due to admixed quartz). Tremolite predominates; in thin sections it is colourless, but usually it contains parallel intergrowths of blue riebeckite; it has $\gamma - \alpha$ 0·027, $c : \gamma = 20°$ about, and is optically negative with axial plane in (010). The riebeckite has very weak birefringence, $c : \alpha = 5°$ about; optically negative and axial plane in (010); pleochroism, α deep-blue, β violet-blue, γ greenish-yellow. (2) Chloritoid-bearing crystalline schist from Tarapaka, on the left bank of the Inguletz river.—This contains chloritoid, muscovite, chlorite, quartz, magnetite, and sometimes haematite and tourmaline. The chloritoid gives variable values for the optic axial angle, and the extinction-angle measured to the cleavage-cracks or the twin-lamellae on (001) ranges from 0° to 20°, being usually 8° to 15°. The mineral is very rich in inclusions, especially of quartz, also magnetite, tourmaline, and chlorite. Analysis II corresponds approximately with the formula $H_2FeAl_2SiO_7$. (3) Garnetiferous amphibole-schist from the left bank of the Inguletz river.—This contains amphiboles of two kinds (in thin sections, green and almost colourless), quartz, iron-ore, biotite,

chlorite, and garnet. The garnet gave analysis III (mean of two; also TiO_2 0·45) corresponding with the formula $35Fe_3(Al,Fe)_2Si_3O_{12} \cdot 5Ca_3Al_2Si_3O_{12} \cdot 1Mn_3Al_2(Si,Ti)_3O_{12}$. (4) Staurolite-muscovite-schist from Chervonaya ravine. The origin of the whole of the Krivoy-Rog schist complex is considered, and the rocks are regarded as derived from normal sediments.

	SiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MnO.	MgO.	CaO.	Na_2O.	K_2O.	H_2O.	Total.
I.	58·31	1·04	10·46	3·95	trace	13·99	8·51	4·10	0·51	0·97	101·84
II.	27·30	37·80	6·85	20·82	—	0·93	—	—	—	6·19	99·89
III.	36·86	19·91	3·69	34·55	0·99	—	3·71	—	—	0·51	99·67

P. N. C.

[Kupletsky (B. M.)] Куплетский (Б. М.). О прените с Ботогольского гольца.—*Sur une roche à prehnite des Monts Botogol en Sibérie.* Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 84–87.

The Botogol (Batugol) massif in the Eastern Sayan Mts. (near the famous Aliber graphite mine in Irkutsk) consists of syenites and nepheline-syenites. At their contact with limestones these rocks are enriched in calcium and pass into diorites and nepheline-plagioclase-rocks. Prehnite veins are developed in the contact-zone in the diorites. The prehnite forms tabular crystals (3–5 mm.) with α 1·615, β 1·627, γ 1·647, 2V 55½, optic axial plane (010), positive, strong dispersion $\rho > v$. Analysis by N. P. Vrevskaya gave SiO_2 42·61, Al_2O_3 23·82, Fe_2O_3 1·73, CaO 26·10, MgO 0·13, Na_2O 2·09, K_2O 0·03, H_2O 3·57, H_2O (hygrosc.) 0·19 = 100·27. P. N. C.

[Chirvinsky (P. N.)] Чирвинский (П. Н.). Родоначальная магма глубинных пород Ильменских гор.—Tschirwinsky (Peter). *Zur Frage des Urmagmas der Tiefengesteine des Ilmengebirge.* Зап. Росс. Мин. Общ. (Verh. Russ. Min. Gesell.), 1925, vol. 54, pp. 37–50 (Russ., with Germ. résumé, pp. 49–50).

From the areas occupied by different types of igneous rocks shown on the geological map of the Ilmen Mts., southern Urals, and from the averages of published chemical analyses of these rocks, the author calculates the average chemical composition for the whole complex. The areas are: granites and granite-gneisses 76·64, normal syenites 7·20, nepheline-syenites (miassites) 16·17, amphibolites with talc- and chlorite-schists 1·42, pyroxenites and serpentines 0·57 % (of a total area of 495 sq. km.). The average arrived at is: SiO_2 67·24, TiO_2 0·16, Al_2O_3 16·74, Fe_2O_3 0·66, FeO 1·65, MnO 0·03, MgO 1·03, CaO 2·77, BaO 0·02, Na_2O 6·14, K_2O 2·81, H_2O (ign.) 0·44, H_2O (at 110°) 0·12, CO_2

0·19. By assuming certain volatile constituents the composition of the original magma is also calculated. The differentiation of such a magma is discussed. L. J. S.

Sederholm (J. J.). *The average composition of the earth's crust in Finland.* Bull. Comm. Géol. Finlande, 1925, no. 70, 20 pp. ; Fennia (Bull. Soc. Géogr. Finlande), Helsingfors, 1925, vol. 45, no. 18, 20 pp.

The map area in Finland occupied by granitic rocks amounts to 52·5 %, migmatites 21·8, granulites (leptynites) 4·0, schists 9·1, quartzites and sandstones 4·3, limestones and dolomites 0·1, and basic rocks 8·2 %. The average composition of each of these rocks is deduced from published analyses. The calculation based on these areas and mean analyses gives for the average: SiO_2 67·70, TiO_2 0·41, Al_2O_3 14·69, Fe_2O_3 1·27, FeO 3·14, MnO 0·04, MgO 1·69, CaO 3·40, Na_2O 3·07, K_2O 3·56, P_2O_5 0·11, H_2O 0·79, minor constituents 0·13 %, which corresponds with granodiorite. By so taking areas into account the undue influence of the larger number of analyses of rarer rock types is eliminated ; and consequently the results do not agree with those of Clarke and Washington [Abstr., vol. 2, pp. 60, 389]. L. J. S.

Molengraaff (G. A. F.) & Hall (A. L.). *Alkali granite and nepheline syenites, canadite and foyaite, in the Vredefort Mountainland, South-Africa.* Proc. Sect. Sci. K. Akad. Wetensch. Amsterdam, 1924, vol. 27, pp. 465–486, 1 pl., 2 text-figs. [Translated from the Dutch; Verslag, vol. 33.]

Hall (A. L.) & Molengraaff (G. A. F.). *The Vredefort Mountain Land in the southern Transvaal and the northern Orange Free State.* Verhand. K. Akad. Wetensch. Afd. Natuurk. Amsterdam, 1925, vol. 24, no. 3, 183 pp., 1 map, 39 pls., 20 text-figs.

Hall (A. L.). *On the metamorphism of the Lower Witwatersrand system in the Vredefort Mountain Land.* Trans. Geol. Soc. S. Africa, 1926, vol. 28 (for 1925), pp. 135–176, 1 fig.

The monograph of Hall and Molengraaff is largely concerned with the tectonic problems of the Vredefort area, but it contains chapters on the alkali-granites and nepheline-syenites of the region, on the metamorphism of the Witwatersrand beds, and on the pseudo-tachylyte or flinty crush-rock which is abundantly developed there. The noteworthy conclusion is reached that, in special cases, as the result of very great stress, mechanically generated heat can be allowed as an important contributory factor in rock-genesis. The earlier paper contains an advance account of

the alkali-rocks; the later one gives a fuller account of the metamorphic process and metamorphic rocks. S. J. S.

Ross (Clarence S.). *Nephelite-hauynite alnoite from Winnett, Montana.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 218–227.

A rock from Winnett, Fergus Co., Montana, is described as a nepheline-haüyne-alnöite. It shows olivine phenocrysts in a dark groundmass. The minerals are of two generations: (1) olivine, nepheline, and augite (?); (2) melilite, haüyne, phlogopite, apatite, and iron-ores. Those of the second generation replace olivine and nepheline; and it is suggested that they were formed by the later action of alkali-rich solutions. A chemical analysis of the rock is given. L. J. S.

Smith (Walter Campbell), with chemical analyses by Mountain (Edgar Donald). *The volcanic rocks of Christmas Island (Indian Ocean).* Quart. Journ. Geol. Soc. London, 1926, vol. 82, pp. 44–66, 1 pl., 2 text-figs.

Petrographical descriptions are given of alkali-trachyte, trachybasalt, andesine-trachybasalt, olivine-basalt, nepheline-basanite, limburgitic basalt, and limburgite. Seven detailed analyses are given. Plotting bases against silica, there is with increasing silica a linear decrease in MgO, CaO, FeO, and an increase in Al_2O_3, Na_2O, K_2O, TiO_2. L. J. S.

Ray (Suhrid Kumar). *Geological and petrographic studies in the Hercynian Mountains around Tiefenstein, southern Black Forest, Germany.* London (L. Upcott Gill & Son), 1925, viii + 111 pp., 16 pls., 13 text-figs.

This district was mapped by the author in 1922–3, and his description of the rocks is given as a thesis from the University of Zürich. The rocks of 'Grundgebirge' include sedimentary gneisses (fibrolite-cordierite-gneiss, cornubianite-gneiss, diopside-hornfels), eruptive gneiss (granulite), and injection gneisses, with amphibolite and hornblende-anorthosite intrusions. These are intruded by the Alb-thal granite and dikes of aplite, granite-porphyry, and lamprophyres. Several types of enclaves in the granite are described. Ten new rock analyses and one of an orthoclase phenocryst from the granite are given. A crystal of orthite from the granite is figured. A bibliography is appended. L. J. S.

Bowen (N. L.). *The mineralogical phase rule.* Journ. Washington Acad. Sci., 1925, vol. 15, pp. 280–284.

The 'mineralogical phase rule' as here considered is a special case of the well-known rule of Gibbs excluding vapour and liquid phases. Thus the number of solid phases (i.e. crystal-kinds) possible in a three compo-

nent system is five, but the system is then invariant and only in equilibrium at a particular temperature and pressure. The trouble, as usual, is to work out the conditions in polycomponent systems. It is usual to reduce the number of components in two ways. The first way is to assume that two components, which form a series of mixed crystals, can be considered as one component; and the second is that within the concentration limits where molecules enter into a limited series of solid solutions they may be considered as one component. The paper shows that in general these simplifying assumptions are valid, but in both cases cites instances in which they do not hold. Caution is therefore required in simplifying polycomponent systems. W. A. R.

Sargent (H. C.). *Notes on the petrology of Penmaenmawr mountain. (Part II.)—The acid segregations and veins.* Proc. Liverpool Geol. Soc., 1925, vol. 14, pp. 123–142, 1 pl., 1 text-fig.

Acid 'schlieren' and veins are abundant in the upper part of the intrusion. They contain quartz and orthoclase often in micropegmatitic intergrowth; prehnite in plates and sheaves sometimes intergrown with quartz; ilmenite; apatite; and axinite. Pneumatolytic alteration has attacked the felspar chiefly, producing kaolin and sericite; actinolite and chlorite; some prehnite which has a different appearance to the primary mineral mentioned above; and also epidote. An analysis of the segregations shows 68 % of silica and over 11 % of lime. In the Graig Lwyd area are thin veins and druses containing the minerals axinite, prehnite, pectolite, zoisite, epidote, talc, calcite, and quartz. These minerals are found in various associations, and a feature is the intergrowth of axinite and prehnite. The occurrence of these segregations and veins is due to late concentration by the volatile constituents. W. A. R.

Tilley (Cecil Edgar). *Contact-metamorphism in the Comrie area of the Perthshire highlands.* Quart. Journ. Geol. Soc. London, 1924, vol. 80, pp. 22–71, 1 pl., 1 text-fig.

The Carn Chois diorite-complex has affected the lowly metamorphosed sediments. The contact aureole is 600 yards wide, and the first sign of alteration is a zone of biotite, followed by one of cordierite which passes rapidly into a zone of true hornfelses. The silica-free hornfelses range from andalusite-cordierite types to cordierite-hypersthene assemblages; and with increasing iron and magnesia through hypersthene-bearing types to plagioclase-diopside types with increasing lime content. There are also silica-poor types without quartz containing corundum and spinel. A classification of these silica-poor hornfelses is suggested. W. A. R.

Neaverson (E.). *The petrography of the Upper Kimmeridge Clay and Portland Sand in Dorset, Wiltshire, Oxfordshire, and Buckinghamshire.* Proc. Geol. Assoc. London, 1925, vol. 36, pp. 240–256, 1 pl., 2 text-figs.

Mechanical analysis shows that the sands are characterized by a high proportion of the grade 'fine sand'. The clays show a considerable variation in mechanical constitution. Thirty-two minerals have been identified, including abundance of tourmaline of various kinds, some kyanite, and one grain of corundum. The minerals in the Upper Kimmeridge Beds from the southern portion of the district were derived from the rocks of the Armorican land mass, whilst those from the northern part came from the north, including contributions from Scotland. W. A. R.

Hartley (J. J.). *The succession and structure of the Borrowdale volcanic series as developed in the area lying between the lakes of Grasmere, Windermere and Coniston.* Proc. Geol. Assoc. London, 1925, vol. 36, pp. 203–226, 4 pls.

The generalized succession of lava flows is, from the base: andesite and augite-andesites; felsitic tuffs with much rhyolitic material; acid andesites allied to trachytes; and, on the top, rhyolites. The acid andesites include rocks containing both orthoclase and albite. W. A. R.

Reynolds (Sidney Hugh). *The igneous rocks of the Tortworth inlier* [Gloucestershire]. Quart. Journ. Geol. Soc. London, 1924, vol. 80, pp. 106–112, 2 pls.

There are two bands of igneous rock. The lower of these is an olivine-basalt, and is now regarded as intrusive. It consists mainly of felspar laths, originally labradorite, now largely albitized. The upper band is an amygdaloidal lava and a pyroxene-andesite. It contains xenocrysts of felspar and quartz, the latter surrounded by reaction rims originally consisting of pyroxene. The felspars are also albitized. W. A. R.

Melmore (Sidney). *On a quartz-porphyry from the Lake District.* Geol. Mag., 1924, vol. 61, pp. 513–515.

From Thwaite Head, between Coniston Lake and Windermere, Lancashire, chlorite pseudomorphs after idiomorphic hornblende—a rare mineral in the Lake District—are recorded. W. A. R.

Wells (Alfred Kingsley). *The geology of the Rhobell Fawr district (Merioneth).* Quart. Journ. Geol. Soc. London, 1925, vol. 81, pp. 463–538, 3 pls., 16 text-figs.

An Ordovician volcanic sequence similar to that on Cader Idris is described. The Rhobell Fawr volcanic group is noteworthy for being the

earliest outburst yet recorded in North Wales; it lies at the base of the Ordovician. The rocks described include andesitic, rhyolitic, and spilitic types, with a suite of minor intrusives ranging from porphyrites to dolerites. An interesting group of veins consisting of idiomorphic albite in a groundmass of orthoclase, and almost free from coloured constituent, is referred to the aplites as 'dolerite-aplites'. The albite shows, besides the usual twins, a number of less common types including cruciform and diagonal twins, passing into a chequer type. W. A. R.

Phillips (F. Coles). *Note on a riebeckite-bearing rock from the Shetlands.* Geol. Mag. London, 1926, vol. 63, pp. 72–77, 1 pl., 2 text-figs.

The dikes are found in the Old Red Sandstone igneous suite at Ronas Hill. The riebeckite is found in two different associations. There are primary acicular needles in the groundmass with the typical properties. A secondary variety of platy or fibrous habit is found occupying the centres of pseudomorphs after amphibole. The pseudomorphs are surrounded by a ring of epidote, and the riebeckite is intergrown with clear albite. The pseudomorphism is the result of the introduction of water and alkali during a hydrothermal stage that followed the original crystallization. W. A. R.

Cox (Arthur Hubert). *The geology of the Cader Idris range (Merioneth).* Quart. Journ. Geol. Soc. London, 1925, vol. 81, pp. 539–594, 5 pls., 2 text-figs.

The Ordovician igneous rocks show volcanic series of which the lowest is rhyolitic, passing through a great spilite development, and finally returning to an andesitic and rhyolitic phase. Doleritic and granophyric intrusive sills are associated with the volcanic phase. There is also a bed of pisolitic iron-ore of Llandeilian age, which is considered to be of sedimentary origin. W. A. R.

Meteorites: Cosmochemistry.

Ježek (Bohuslav). *Meteoricke železo z Teplé.* [Iron meteorite from Teplá in Bohemia.] Rozpravy České Akad., class 2, 1923, vol. 33, no. —, 6 pp., 1 pl.

—— *Iron meteorite from Teplá in Bohemia.* Bull. Internat. Acad. Sci. Bohême, 1923, vol. 25, pp. 275–276. (English summary.)

This meteoric iron was found while ploughing at Finsterhölzel-Ries near Teplá on September 18, 1909, and consisted of two pieces weighing 14,420 and 2,629 grams. It is a medium octahedrite with abundant plessite. The kamacite bands are 2–3 cm. long and 0·6–1·2 mm. wide,

and those of taenite 0·07–0·18 mm. wide. Troilite forms nodules and Reichenbach lamellae, sometimes with kelypho-kamacite rims; schreibersite-rhabdite is frequent, but the presence of cohenite is indicated only by the analysis. The analysis by J. S. Štěrba-Böhm gave: Fe 88·80, Ni 7·47, Co 1·75, P 0·25, C 0·35, S trace, Ca 0·70, Mg 0·52, Si trace, total 100·04; sp. gr. 7·94. The main piece of the meteorite remains at Teplá in the monastery; the National Museum at Prague possesses 1,360 grams. F. S.

[Voznesensky (A. V.)] Вознесенский (А. В.). Падение метеорита 30 июня 1908 г. в верховьях р. Хатанги. [*Fall of a meteorite on June 30, 1908, in the upper course of the Khatanga river.*] Мировеление (Mirovédénié, Bull. Soc. Russ. des Amis de l'Étude de l'Univers), 1925, vol. 14, pp. 25–38, 1 map.

[Obruchev (S. V.)] Обручев (С. В.). О месте падения большого Хатангского метеорита 1908 г. [*On the place of fall of the great Khatanga meteorite in 1908.*] Ibid., pp. 38–40, 1 map.

A gigantic meteorite is believed to have fallen in the evening of 17 (30) June 1908 in a difficultly accessible region on the Khatanga river, a right tributary of the Podkamennaya (Stony) Tunguska, at 60° 16′ N., 103° 6′ E. of Greenwich, and 893 km. north of the town of Irkutsk in Siberia. Detonations were heard and light effects were seen over a very wide area, and a forest fire was started. At the Irkutsk observatory the seismograph recorded an earthquake wave at 0 h. 19 m. Greenwich time, and sounds were heard 1 hr. 2 m. 17 s. later. At Kirensk the barograph was affected at 7.15 p.m. (local time), and at the same moment a huge column of fire and a dense grey cloud were seen and five detonations heard; 15 minutes later more detonations were heard (suggesting more than one meteorite). The path of the meteor was from ESE. to WNW., or according to other observers from east to west. P. N. C.

[Chirvinsky (P. N.)] Čirvinskij (P. N.). Колпчественный состав трех метеоритов.—*La composition quantitative de trois météorites.* Věstník Královské České Společnosti Nauk, Tř. II (Mém. Soc. Roy. Sci. Bohême, Cl. Sci.), Prague, 1926, vol. for 1925, no. —, 23 pp., 3 figs. (Russian, with French résumé pp. 20–23.)

Measurements of photographs of three plates of the Estherville mesosiderite gave an average of 29·75 % of metal by volume. Figures of three plates of Mincy gave 36·20 % (volume) of metal. From this result and from the published analyses of the stony and metallic portions, the

bulk composition of this mesosiderite is calculated. The proportion of pyroxene to anorthite in the stony portion is 79·54 : 20·46 (by weight), which is compared with Stannern (pyroxene 62·35), Shergotty (76·99), and others, all of which are far from the eutectic of bronzite (46·49) and anorthite (53·51).

Y. I. Kasyanov (Я. И. Касьянов, Jacob Kassianov) & P. N. Chirvinsky (pp. 13–20, 23) examined the Bluff meteoric stone by the Rosiwal micrometric method, and deduce the mineral composition: pyroxenes and olivine 86·11, plagioclase 0·07, nickel-iron 6·76, troilite 5·75, chromite 1·31 weight %. G. T. P.

Lacroix (A.). *La météorite (eucrite) tombée dans la Haute Volta.* Compt. Rend. Acad. Sci. Paris, 1925, vol. 181, pp. 745–749.

A stone of about 18 kg. fell on June 27, 1924, between 3 and 4 p.m., after detonations, near the village of Béréba. It was roughly oval in shape and measured 40 × 21 × 19 cm. It is a eucrite almost precisely similar to Juvinas in physical and, according to analyses by Raoult, also in chemical characters. G. T. P.

Fernández Navarro (Lucas). *El meteorito de Olivenza (Badajoz).* Trabajos del Museo Nacional de Ciencias Naturales, Madrid, Ser. Geol., 1925, no. 35, 27 pp., 10 pls.

Navarro (Fernandez). *La météorite d'Olivenza (Espagne).* Compt. Rend. Acad. Sci. Paris, 1925, vol. 180, pp. 1674–1676. [Cf. Abstr., vol. 2, pp. 394, 560.]

Examination of the meteorite shows that it is an olivine-hypersthene-chondrite having a specific gravity of 3·45. A complete chemical analysis by F. Raoult gave for the principal constituents nickel-iron 1·18 with Ni 0·41, troilite 6·01, SiO_2 40·73, Al_2O_3 2·30, FeO 20·74, MgO 25·16, CaO 2·09, Na_2O 0·92 %. A remarkable feature is the long drawn out, confusedly parallel 'thumb-marks' on parts of the stone. G. T. P.

Hadding (Assar). *Der Hedeskoga-Meteorit.* Geol. För. Förh. Stockholm, 1924, vol. 46, pp. 383–392, 5 pls., 3 text-figs.

An account is given of the fall of a meteoric stone at Hedeskoga, near Ystad on the south coast of Sweden, at 7.45 p.m. on April 20, 1922. Its weight was 3,515 grams, sp. gr. 3·17, and it is a grey chondrite with fine black veins. The chondrules consist mainly of olivine, rarely of rhombic pyroxene, and they are set in a groundmass rich in nickel-iron and troilite. Analysis by N. Sahlbom gave: SiO_2 30·19, TiO_2 0·05, Al_2O_3 4·36, Fe_2O_3 6·89, FeO 4·90, Fe 20·91, CaO 1·24, MgO 24·10, Cr_2O_3 0·30, NiO 1·04, S 2·99, H_2O 0·12 = 97·09. L. J. S.

Chudoba (Karl). *Zum Meteorsteinfall und -fund in Lanzenkirchen (Niederösterreich).* Centralblatt. Min., Abt. A, 1925, pp. 373–375.

After appearance of fire-ball and detonations a meteoric stone weighing about 5,060 grams fell on August 28, 1925, at about 7·25 p.m., and was found next day in a hole 50 cm. deep in a meadow at Lanzenkirchen, 7 km. south of Wiener Neustadt. G. T. P.

Michel (H.). *Der Meteorsteinfall von Lanzenkirchen in Niederösterreich.* Ann. Naturhist. Mus. Wien, 1925, vol. 39, pp. 1–4, 1 fig.

In addition to the stone of 5 kg. (preceding abstract), another stone (2 kg.) of the same fall was found on October 7, 1925, at Frohsdorf, $2\frac{1}{2}$ km. north-east of the first find. This stone shows on the cut surface lighter (D 3·45) and darker (D 3·53) portions, and consists of enstatite and olivine with much nickel-iron and troilite. Chondrules, mostly of enstatite, are abundant. L. J. S.

MacNaughton (Lewis W.). *Notes on the undescribed meteorites in the collection of the American Museum of Natural History.* Amer. Mus. Novitates, New York, 1926, no. 207, 2 pp.

The meteorites mentioned are the stone, Culbertson (Nebraska, found 1913); the stony-irons, Alten (= Finmarken, Norway, 1902), and Ollague (Bolivia, found 1924); and the irons, Akpohon (Ellesmere Land, found 1913), Burkett (Texas, found 1913), Cruz del Aire (Mexico, found 1911), Knowles (Oklahoma, found 1903), Leroy (locality unknown), Norfolk (Virginia, fell September 1907), and Ysleta (Texas). G. T. P.

Udden (J. A.). *The Troup, Texas, meteorite.* Proc. U.S. Nat. Mus., 1921, vol. 59, pp. 471–476, 2 pls., 2 text-figs.

A stone weighing $2\frac{1}{4}$ lb. was seen to fall, after detonations, on the morning of April 26, 1917. It was of splinter-like form, quadrangular in cross-section, and measuring about 15 cm. in length. A partial analysis was made by E. P. Schoch and J. E. Stullken. G. T. P.

Merrill (George P.). *On the mineral composition and structure of the Troup meteorite.* Proc. U.S. Nat. Mus., 1921, vol. 59, pp. 477–478, 1 pl.

Microscopical examination showed the stone to be an intermediate chondrite. The chemical analysis (preceding abstract) is considered to have been made on too small an amount of material to give a correct idea of the composition of the stone as a whole. G. T. P.

Merrill (George P.). *On a meteoric iron from Four Corners, San Juan County, New Mexico.* Proc. National Acad. Sci. U.S.A., 1924, vol. 10, pp. 312–318, 5 figs.

A mass of meteoric iron of about 25 kg. and measuring $16\frac{1}{2} \times 26\frac{1}{2} \times 26\frac{1}{2}$ cm. was found 15 miles south-east from the common corner of Colorado, New Mexico, Arizona, and Utah. The iron shows a brecciated octahedral structure and contains numerous angular inclusions up to 15 mm. in diameter consisting of fine-grained granular aggregates of pyroxenes with a little olivine, often considerable amounts of iron phosphide and iron sulphide, and a few felspathic granules and particles of calcium phosphate. Chemical analyses of the iron and the insoluble portion of the inclusions were made by J. E. Whitfield: the percentage of nickel in the iron is 9·57. The meteorite shows the closest analogy with the Copiapo meteoric iron with silicate inclusions. G. T. P.

Merrill (George P.). *On a stony meteorite from Anthony, Harper County, Kansas, and a recently found meteoric iron from Mejillones, Chile.* Proc. National Acad. Sci. U.S.A., 1924, vol. 10, pp. 306–312, 5 figs.

A much oxidized meteoric stone of about 20 kg. and measuring $33 \times 24 \times 16\frac{1}{2}$ cm. was ploughed up in 1919 near Anthony. A chemical analysis by J. E. Whitfield gave 20·90 % metallic constituents and 4·65 of iron sulphide. The stone is probably a grey chondrite. The meteoric iron from Mejillones was a mass of about $14\frac{1}{2}$ kg. and measuring some $12 \times 14 \times 28$ cm. found about 1905 between Morro de los Guanaros de Mejillones and Caleta Herradura Grande about 9 km. from the sea. It is classified as an ataxite of the Nedagolla group and has a percentage of Ni of 5·8 according to an analysis by J. E. Whitfield. In character therefore it is near the original Mejillones iron which has been described as a brecciated hexahedrite, but it is so little oxidized or sand-blasted as to suggest a more recent fall. G. T. P.

Merrill (George P.). *Notes on the meteoric stone of Colby, Wisconsin.* Proc. U.S. National Mus., 1925, vol. 67, art. 2, 3 pp., pl. 1.

Two stones of about 150 lb. and 80 lb. fell on July 4, 1917. The larger split into pieces by impact with granite, the smaller when extracted from the earth is said to have been so cold that frost formed on its surface. The stone is an intermediate chrondrite containing, according to an analysis of J. E. Whitfield, only about 1 % of metal and $7\frac{1}{2}$ % of troilite. The metal contains Ni 7·68 and Co 0·84 %. G. T. P.

Glenn (L. C.). *A new meteorite from Baldwyn, Miss.* Amer. Journ. Sci., 1925, ser. 5, vol. 9, p. 488. [See Abstr., vol. 2, p. 560.]

Vogel (Rudolf). *Über die Struktur der Eisen-Nickelmeteoriten.* Zeits. Anorg. Chem., 1925, vol. 142, pp. 193–228, 4 pls., 6 text-figs.

Vogel (R.). *Die Struktur der Eisenmeteoriten als Folge der δ-γ-Umwandlung des Eisens.* Neues Jahrb. Min., Abt. A, 1925, Beil.-Bd. 53, pp. 134–148, 2 pls., 4 text-figs.

An equilibrium diagram showing the δ and γ fields is given for iron-nickel alloys. At the transition-point (about 1455°) the δ-mixed crystals contain about 6 % Ni, and the γ-mixed crystals 20 % Ni. The former, representing kamacite, separate as dendrites from the melt; and the latter, representing taenite, wrap round the kamacite and are secondary, being due to interaction between the kamacite and the melt. Two kinds of structure are distinguished: 'crystallization-figures', due to primary crystallization from the melt; and 'transformation-figures', produced in the solid by the δ-γ-transformation. Both of these are unstable: when the alloy is heated, a stable granular structure results. L. J. S.

Kasé (Tutom). *On the Widmanstätten structure in iron-carbon and iron-nickel alloys and in meteorites.* Sci. Rep. Tôhoku Imp. Univ. Sendai, ser. I, 1925, vol. 14, pp. 537–558, 4 pls., 6 text-figs.

Widmanstätten structure was developed in iron-carbon and in iron-nickel alloys by rapid cooling after annealing for some time above 1000° (i. e. above the transition point of γ- to β-iron). Meteoric iron (Sacramento, with 7·8 % Ni) when heated at this temperature for many hours and cooled in air showed only a granular structure, but when quenched in water Widmanstätten structure was shown. Heating at 550–560° (i. e. in the region of α-iron) destroys the Neumann lines. Determinations were also made of the magnetic intensity at different temperatures and the thermal expansion of the Sacramento meteoric iron; and comparative tests of the hardness of the kamacite and taenite. [Cf. Min. Mag., vol. 20, p. 173.] L. J. S.

Adams (L. H.) & Williamson (E. D.). *The composition of the earth's interior.* Smithsonian Report, 1925, for 1923, pp. 241–260, 6 figs.

A re-publication with slight alterations of an earlier paper 'Density distribution in the earth' by E. D. Williamson and L. H. Adams [Abstr., vol. 2, p. 345]. L. J. S.

Tammann (G.). *Zur Analyse des Erdinnern. II.* Zeits. Anorg. Chem., 1924, vol. 134, pp. 269–276, 4 figs. [Cf. Abstr., vol. 2, p. 257.]

Experiments have been made on the action of free metals (Al, Fe, Ni, Mn) on fused silicates of iron and calcium. The possibility of a sulphide layer between the metallic core and the surface crust of the earth is further discussed. L. J. S.

Clarke (Frank Wigglesworth). *The evolution and disintegration of matter.* Prof. Paper U.S. Geol. Survey, 1924, no. 132–D, pp. 51–86, 1 pl.

An interesting and instructive essay giving a review and criticism of the views held respecting the chemical composition of nebulae and stars down to meteorites and the earth; the electrical theory of matter; the periodic table of the elements and atomic numbers; evolution of chemical compounds; radioactivity and the breaking down of chemical elements; &c. L. J. S.

Linck (G.). *Ein neuer kristallführender Tektit von Paucartambo in Peru.* Chemie der Erde, 1926, vol. 2, pp. 157–174, 1 pl., 1 text-fig.

This tektite from Peru is of the size of a man's fist, weighs 470 grams, has a specific gravity of 2·36 and refractive index 1·485. It is remarkable in containing minute inclusions of andalusite, sillimanite, wollastonite, scapolite, orthoclase, oligoclase-andesine, zircon, aegirine-augite, augite, biotite, quartz, cordierite, spinel, ilmenite or haematite, and what appears to be cristobalite. From a review of the tektites generally the author concludes that they are neither artifical products nor terrestrial eruptive rocks, but either come from the moon or are products of the fusion of a clastic sediment of some other celestial body. G. T. P.

Michel (H.). *Die Entstehung der Tektite und ihre Oberfläche.* Ann. Naturhist. Mus. Wien, 1925, vol. 38 (for 1924), pp. 153–161, 1 fig.

A review is given of the different views that have been held as to the origin of tektites. It is suggested that these bodies have been formed by the oxidation in the earth's atmosphere of the diffuse matter of the tails of comets. The form acquired during rotation of the molten drops would depend on the viscosity of the material, which would be cooled quickly as a glass. The constancy in the chemical composition and form of tektites found in each area on the earth's surface is an expression of this viscosity. The surface sculpturing of tektites is attributed to subsequent corrosion. L. J. S.

Hövig (P.). *Over billitonieten, ertslaag en woestijnklimaat.* [On billitonites, ore-deposit, and desert-climate.] Verh. Geol.-Mijnb. Genoot. Nederland, Geol. Ser., 1923, vol. 7, pp. 1–13, 3 figs.

The billitonites of the island of Billiton, Dutch East Indies, are found beneath the alluvial deposits of tin-ore and immediately on the bed-rock. It is thought that their surface sculpture was produced during desert conditions that prevailed from the Upper Jurassic to the close of the Eocene period. L. J. S.

Veen (R. W. van der). *Origin of the tectite sculpture and some consequences.* Verh. Geol.-Mijnb. Genoot. Nederland, Geol. Ser., 1923, vol. 7, pp. 15–41, 6 pls.

Various observations and experiments made on tektites point to the material being a glass, rather than a gel (as suggested by N. W. Easton, Abstr., vol. 1, p. 407). Etching with hydrofluoric acid produced markings similar to the natural sculpturing. It is concluded that tektites are glasses, probably of cosmic origin, and that the sculpturing is due to subsequent chemical corrosion on the earth's surface. L. J. S.

Miscellaneous.

Sève (P.). *Contribution à l'étude des propriétés optiques de la calamine.* Journ. Physique et Radium, 1924, ser. 6, vol. 5, pp. 249–256, 6 figs.

For the visible spectrum the optic axial plane in hemimorphite is parallel to (100), but for the ultra-violet it is (010). 2E for Li 82° 54′, for Na 80° 30′, and for wave-length 367 $\mu\mu$ 47° 48′; by extrapolation, uniaxial at 327 $\mu\mu$. The birefringence $\beta - a$ on (001), determined by the interference-band method [Abstr., vol. 2, p. 355] for wave-lengths 670 to 310 $\mu\mu$, is given on a curve and also shows a change over at 327 $\mu\mu$. L. J. S.

Van Horn (Frank R.). *The occurrence of a large iron-tourmaline in Alabama pegmatite.* Amer. Min., 1925, vol. 10, pp. 348–350, 2 figs.

An account is given of a large crystal of black tourmaline found some years ago in a mica mine in pegmatite near Micaville, Randolph Co., Alabama. The portion preserved measures 7 inches high and 10 inches in diameter, and weighs 43½ pounds. The complete crystal was originally 3 to 3½ feet long. L. J. S.

Tokody (László). *Adatok a schafarzikit kristálytani és fizikai sajátságainak ismeretéhez.* Math. Természettud. Értesítő, Budapest, 1926, vol. 42, pp. 123–126, 1 fig.

Tokody (L.). *Beiträge zur Kenntnis der kristallographischen und physikalischen Eigenschaften des Schafarzikits.* Ibid., p. 127 (German summary); Zeits. Krist., 1925, vol. 62, pp. 123–126, 1 fig.

Measurements of schafarzikite crystals from Pernek, com. Pozsony, Hungary [Abstr., vol. 1, p. 200], gave the same forms as before with additional m (110) and p (111), and the new axial ratio $a:c = 1:0{\cdot}95381$. The crystals are red to red-brown and opaque with metallic lustre; streak brown. Only thin splinters are transparent. Optically uniaxial and positive; refraction strong ($>1{\cdot}74$), birefringence weak; pleochroism, ω straw-yellow, ϵ brownish-yellow. Hardness $3\frac{1}{2}$, sp. gr. about 4·3.

K. Z.

Tokody (L.). *Zur Kristallographie des Realgars von Felsöbánya.* Zeits. Krist., 1925, vol. 61, pp. 553–557, 2 figs.

On realgar from Felsőbánya in Hungary 27 forms were observed, two, τ (041) and Θ (6.13.0), of which had not been known before for this mineral, and two, ϵ (101), s (032), which had not been noticed previously on crystals from this locality. [Goldschmidt's orientation.] H. H.

Liffa (Aurél). *Diopszid Csiklovabányáról.* [Summary:] Liffa (A.). *Diopsid aus Csiklovabánya.* Math. Természettud. Értesítő, Budapest, 1926, vol. 42, pp. 224–238 (Hung.), p. 239 (Germ.), 14 figs.

This diopside occurs with idocrase and wollastonite in blue calcite, and is of contact-metamorphic origin. The crystals (1–4 mm.) are olive-green or pale-green, of short-prismatic habit, and often developed at both ends. They show the forms $a\ b\ c\ m\ \Sigma\ z\ u\ \mu\ \sigma\ w\ \tau\ r\ s\ o\ \lambda\ \epsilon\ \gamma$ [Dana's letters] and new j (11.2.0), $\mathfrak{r}$ (720), $\mathfrak{z}$ (13·15.0), $\mathfrak{q}$ (114), $\mathfrak{p}$ ($\bar{2}25$), $\mathfrak{v}$ ($\bar{7}27$), $\mathfrak{s}$ ($\bar{8}38$), $\mathfrak{y}$ (384), $\mathfrak{x}$ (353)?, $\mathfrak{T}$ (563)?, and vicinal $\mathfrak{w}$ ($\bar{1}\bar{1}.11.6$). Good measurements gave the ratios $a:b:c = 1{\cdot}09202:1:0{\cdot}59379$, $\beta = 74°\,36'\,31''$. Analysis by K. Emszt: SiO_2 52·75, Al_2O_3 3·61, FeO 1·91, MgO 17·03, CaO 25·24 = 100·54.

K. Z.

Koch (Sándor). *Vesuvián és scheelit Csiklováról.* [Translation:] Koch (A.). *Über den Vesuvian und Scheelit von Csiklova.* Földtani Közlöny, Budapest, 1925, vol. 54 (for 1924), pp. 85–90 (Hung.), pp. 195–199 (Germ.), 3 figs.

On sixteen crystals of idocrase from Csiklova, com. Krassó-Szörény,

fourteen forms were identified: *c a m f p b t ι o v z s v n*, [Dana's letters], of which six are new for this locality. The larger (to 7 cm.) brown to greenish-brown crystals are pyramidal in habit, and smaller (to 2 cm.) leek-green crystals are short-prismatic. The more common combinations are *m a p o*; *c m a p b i o z s* (pyramidal); *m a f p b o z*; *c m a f p b t o v z s v n* (prismatic). The crystals are opaque, only the smallest being translucent. The pleochroism shown in thin sections parallel to (110) is for brown crystals greenish-yellow (*c*) and reddish-brown, and for green crystals leek-green (*c*) and golden-green. Scheelite occurs as larger (5 mm.) crystals *p* (111) of a yellowish colour and attached to arsenopyrite; and as smaller (2 mm.) white crystals with bismuthinite and tetradymite. The latter show the forms *e* (101), *s* (311), *c* (001), and *p* (111). K. Z.

Rakusz (Gyula). *A dobsinai azbeszt és feldolgozása.* [Translation:] Rakusz (J.). *Der Asbest von Dobschau und seine Verarbeitung.* Földtani Közlöny, Budapest, 1925, vol. 54 (for 1924), pp. 56–59 (Hung.), pp. 174–176 (Germ.), 1 fig. [Cf. Abstr., vol. 2, p. 438.]

The serpentine of the Kälbel and Birkeln hills near Dobsina, com. Gömör, is traversed by many irregular crevices (1–3 cm. across), which were filled by lateral secretion with various minerals—magnetite, garnet, picrolite, webskyite, chrysotile. The fibres of chrysotile are usually bent, and are white, green, or yellowish in colour. In thin sections parallel to the fibres the material is pleochroic, β pale yellowish or colourless, γ pale pinkish-brown. The extinction is straight, and the optic axial plane parallel to the fibre with variable axial angle; dispersion $\rho < v$. Analysis by E. Scherf of pure pale-green material, sp. gr. 2·457, gave: SiO_2 41·45, TiO_2 0·06, Al_2O_3 1·91, Cr_2O_3 0·08, Fe_2O_3 0·70, FeO 0·28, NiO 0·03, MnO 0·03, MgO 40·52, CaO 0·21, Na_2O 0·08, K_2O 0·04, H_2O (at 105°) 1·10, H_2O (over 105°) 13·44, total 99·93. The material is not very suitable for mining and use. K. Z.

Zsivny (Viktor). *A recski Lahoczahegy néhány ásványáról.* [Summary:] *Über einige Mineralien des Lahoczaberges bei Recsk.* Math. Természettud. Értersítő, Budapest, 1926, vol. 42, pp. 128–148 (Hung.), pp. 149–150 (Germ.), 19 figs.

Zsivny (Victor). *Über einige Mineralien des Lahoczaberges bei Recsk* (*Komitat Heves*). Zeits. Krist., 1925, vol. 62, pp. 489–505, 23 figs.

A detailed account of previous work [Abstr., vol. 2, p. 116] with measurements and drawings of crystals and chemical analyses. Enargite,

—Fifty measured crystals showed the forms c b a m d r k n s p [Goldschmidt's letters], and new but uncertain forms (940), (305); the most frequent being c a m k s. The crystals are prismatic or tabular (parallel to a) with dimensions $\frac{1}{6}$–3 mm. Twins on x (320) are terminated not only by c but also k and s. Analysis gave S 32·34, As 17·53, Sb 1·93, Cu 48·16, Fe 0·14, Pb and Bi 0·02, insol. 0·06, Zn, Mn, Ni traces, total 100·18; sp. gr. 4·49. Pyrite.—Forms *o e d n*. Quartz.—Prismatic crystals with *m r z*. Dolomite.—Tabular crystals ($\frac{1}{3}$ mm. thick, by $1\frac{3}{4}$–$3\frac{3}{4}$ mm.) showed the forms *c f r M*. Baryte.—Very small (to 0·5 mm.) tabular crystals with *c a b d l o z y* [Dana's letters]. Whewellite. —The occurrence at Recsk [Abstr., vol. 2, p. 117] is the first certain record of this mineral from Hungary. Four prismatic crystals gave the forms c b m n u e x f s [Goldschmidt's letters]. Only one well-formed heart-shaped twin (3 mm.) was found. K. Z.

Koch (Sándor). *Újabb előfordulású wolframit-kristályok Felsőbányáról.* [Translation:] Koch (Alexander). *A new occurrence of wolframite at Felsőbánya.* Ann. Hist.-Nat. Musei Nationalis Hungarici, 1925, vol. 22, pp. 142–146 (Hung.), pp. 146–148 (Engl.), 4 figs.

Wolframite associated with quartz, chalcopyrite, and dolomite was found in level XI of the east mines at Felsőbánya. The following 16 crystal-forms are listed a b c m d y λ t i k f ω σ o e [Goldschmidt's letters], and new but doubtful ($\bar{6}14$). The faces of a (100) are striated parallel to the *b* or *c* axes. Crystals of tabular habit flattened parallel to a (100) or b (010) are poor in forms; those of prismatic habit have k and b dominant, and it is only on these that d and m are developed. Juxtaposition-twins on a (100) and sub-parallel groupings are common. Observed combinations are: a b y k; a b λ f ω; a b c d f k ω o; a b m d t i k f o σ e and ($\bar{6}14$). K. Z.

Koch (Sándor). *Whewellit-kristály Kapnikbányáról.* Math. Természettud. Értesítő, Budapest, 1925, vol. 42, pp. 151–156 (Hung.), p. 157 (Germ. summary), 3 figs.

Koch (Alexander). *Whewellitkristall von Kapnikbánya.* Zeits. Krist., 1926, vol. 63, pp. 179–176, 2 figs.

On an isolated crystal of whewellite of unusual size (67 × 45·5 × 40 mm., and weighing 115 grams) were observed the forms c x z w e m n u f ϵ s [Goldschmidt's letters]. The crystal is of short-prismatic habit and twinned on ($\bar{1}01$); it is bounded on one side by the cleavage e ($\bar{1}01$), and on the other side by large faces of e s ϵ. The faces u and m are striated, and n shows etch-figures. K. Z.

Vendl (Mária). *Titanit és diopsid Svédországból.* [Translation:] Vendl (Marie). *Titanite et diopside de Suède.* Ann. Hist.-Nat. Musei Nationalis Hungarici, 1925, vol. 22, pp. 109–115 (Hung.), pp. 115–118 (French), 7 figs.

Crystals ($\frac{1}{2}$–6 mm.) of yellowish sphene with associated white calcite and green diopside, from the Thorsbo mine at Finnmossen, showed the forms *a b c v s m n l t w* [Dana's letters]. Three habits of crystals are distinguished: (1) tabular parallel to *a* (100), without *b* (010), combination *a c v m l*; (2) pyramidal, without *c* and *a*, combination *b m n l t w*; (3) tabular parallel to *c* (001) and twinned on *a* (100), on which the ten forms were observed. Seven pale-green transparent crystals ($\frac{1}{2}$–1 mm.) of diopside from Finnmossen were measured, the forms identified being *a b c p χ f m s o* [Dana's letters]; the crystals are of short-prismatic habit with dominant *b c a*. Diopside crystals from the iron mines near Philipstad are light-green and translucent. The forms observed on ten measured crystals were *a b c p z χ f g m i u o s k*. The habit is thick-tabular parallel to *b* (010) or *c* (001), or short-prismatic with dominant *b c a*. The vertically striated face *a* (100) is always smaller than *b* (010). K. Z.

[Gutkova (N. N.)] Гуткова (Н. Н.). Апатиты Хибинских тундр. [*Apatites of Khibinsky tundra.*] (Goutkowa (N.). *Sur les apatites de Monts Chibines.*) Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1925, ser. 6, vol. 19, pp. 123–132.

Three types of occurrence of apatite in veins are distinguished in reference to paragenesis: (1) with magnetite, (2) with biotite, and (3) with sphene. In (1) the apatite is green and is also associated with nepheline. In (2) aegirine, nepheline, and cancrinite are also present; and in (3) nepheline and aegirine. Mineral associations are also described in which apatite is only an accessory. The apatite belongs to different generations and phases: magmatic, epimagmatic, and pneumatolytic. Many localities are mentioned. P. N. C.

[Bonshtedt (E. M.)] Бонштедт (Э. М.). О марганцевом нептуните из Хибинских и Ловозерских тундр. [*On manganiferous neptunite from Khibinsky and Lovozersky tundras.*] (Bonstedt (E.). *Sur le neptunite manganifère des Monts Chibines et Lujawrurt en Laponie russe.*) Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1924, ser. 6, vol. 18, pp. 105–116, 6 figs.

Neptunite has been found at eight spots in the Kola peninsula. At Mannepakhka it occurs on acicular masses of second generation aegirine,

and is associated with natrolite, a mica-like mineral, nepheline, and microcline. At Tavaioka in pegmatite-veins with aegirine, natrolite, eucolite, hackmanite, and ramsayite. In the Angvunsioka cirque it forms aggregates some centimetres across, and is associated with first and second generation aegirine, ramsayite, microcline, and probably murmanite. Measured crystals showed the forms c (001), a (100), b (010), m (110), s (111), o ($\bar{1}11$), d ($\bar{3}01$), p ($\bar{3}11$), i ($\bar{1}12$), r ($\bar{2}21$), v (221), and new ($\bar{1}02$), ($\bar{1}15$) [$a : b : c = 1{\cdot}3164 : 1 : 0{\cdot}8076$, $\beta = 64° 22'$, G. Flink, 1893]. Cleavage (110). Optic axial plane (010), $\gamma : c = +20°$, mean n in white light 1·73. Pleochroism, γ bright orange, β orange-yellow, α citron-yellow. Hardness 5, sp. gr. 3·203: analysis by S. M. Kurbatov [Abstr., vol. 2, p. 264]. P. N. C.

[Fersman (A. E.)] Ферсман (А. Е.). Танталониобаты на среднем Урале. [*Tantaloniobates in the middle Ural.*]—Fersman (A.). *Sur les tantaloniobates de l'Oural d'Ékaterinburg.* Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 10–12.

In the pegmatite zone of the middle Ural the following minerals are found, mostly as rarities, at localities mentioned from north to south. (1) Verkhoture: orthite. (2) Mokrusha (Murzinka): columbite, pyrrhite, euxenite (?). (3) Sarapulka: columbite. (4) Lipovka: columbite and other rare minerals not yet determined. (5) Adui mines: euxenite, monazite. (6) Emerald mines: columbite (and molybdenite). (7) Verkh-Isetsky massif: orthite. The columbite embedded in albite at the Emerald mines forms crystals up to $1\frac{1}{2}$ cm. along the c-axis, and shows the forms (100), (010), (001), (111), (201) [orientation of W. C. Brögger, 1906]. The columbite in muscovite from Sarapulka is tabular parallel to (010), with small (110), (130), (150). P. N. C.

[Bonshtedt (E. M.)] Бонштедт (Э. М.). Об уссингите и шизолите из Ловозерских тундр. [*On ussingite and schizolite from Lovozersky tundra.*]—Bohnstedt (E.) *Sur la ussingite et la schizolite du Lujavrurt en Laponie russe.* Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 17–19.

These minerals, previously known only from Greenland, were found in the Alluaiva cirque in the Kola peninsula. Ussingite forms finely granular masses with dark-violet colour and vitreous lustre. Hardness between 6 and 7; refraction low, birefringence high. Cleavages were observed under the microscope in only a few grains. Easily fusible and soluble in hydrochloric acid. Analysis by N. P. Vrevskaya, SiO_2 59·17, Al_2O_3 17·67, Na_2O 19·66, H_2O 3·80 = 100·30, agrees with

$HNa_2Al(SiO_3)_3$. Enclosed in the ussingite are aegirine needles and single small crystals of schizolite. The latter show the forms *a* (100), *c* (001), *b* (010), *r* (1̄02), *n* (1̄01), *s* (2̄01), *e* (1̄11), and new *v* (101), *w* (102), *q* (203) [axes of O. B. Bøggild, 1903]. P. N. C.

Lingen (J. Steph. van der) & Walker (A. R. E.). *On a heavy mineral concentrate from the Kuils River district, C. P., and the occurrence of xenotime therein.* Trans. Geol. Soc. S. Africa, 1926, vol. 28 (for 1925), pp. 69–72.

—— —— *Xenotime: an accessory constituent of certain Cape Province granites.* Ibid., pp. 73–77, 1 fig.

Concentrates from the Kuils River granite, in the district of Stellenbosch, contain two varieties of zircon, tourmaline, rutile, cassiterite, and a colourless mineral with mean refractive index 1·778. This was identified by spectroscopic and chemical tests as xenotime.

Xenotime was sought in the granites of the Cape Province; samples from many exposures were crushed, concentrated, and fractionated with the electro-magnet. Xenotime was present in every case, as bipyramidal crystals, which were found to have been derived from the biotite in the granite. S. J. S.

Coniglio (L.). *Sulla presenza di solfiti alcalini tra i prodotti dell'attuale attività del Vesuvio.* Annali R. Osservatorio Vesuviano, 1925, ser. 3, vol. 1 (for 1924), pp. 37–39.

An encrustation on lava collected in July 1924 in the crater of Vesuvius consists mainly of sodium and potassium chlorides, and is of interest in containing a small amount of alkali sulphite in the solid form. Analysis gave: Cl 39·97, SO_4 6·25, SO_3 0·15, Cu 3·72, Pb 6·06, Fe 3·65, Ti 0·52, free S 0·62, insoluble in water 8·27, H_2O 0·99, Na,K,Li (diff.) 29·80. The form in which the titanium is present in the aqueous solution is not known. L. J. S.

Carobbi (G.). *Sulla presenza del bromo e del tallio nella silvite dell'eruzione vesuviana del 1906.* Annali R. Osservatorio Vesuviano, 1925, ser. 3, vol. 1 (for 1924), pp. 27–30.

In sylvine from the 1906 eruption of Vesuvius was estimated Br 0·03%, iodine nil. Thallium was detected spectroscopically. The bromine evidently exists as KBr and the thallium as TlCl. L. J. S.

Zambonini (F.) & Restaino (S.). *Sulla presenza del cloruro ferroso fra i prodotti dell'attuale attività del Vesuvio.* Annali R. Osservatorio Vesuviano, 1925, ser. 3, vol. 1 (for 1924), pp. 121–126.

An encrustation collected in 1922 from a hot 'voccolillo' on Vesuvius

was white on fresh fractures, but after exposure to the air became reddish-yellow; and after some time in moist air minute crystals of erythrosiderite [$FeCl_3 . 2KCl . H_2O$] developed on the surface. Analysis gave, Cl 52·00, Br 0·09, Fe″ 1·83, Cu 0·61, Na 12·26, K 33·51 = 100·30, corresponding with $FeCl_2$ 4·15 %. The halite and sylvine show minute birefringent inclusions which are perhaps rinneite [$FeCl_2 . 3KCl . NaCl$], and it is probable that the ferrous chloride is present in this form.

L. J. S.

Carobbi (G.) & Caglioti (V.). *Sulla diffusione del solfato sodico anidro fra i prodotti dell'attuale attività del Vesuvio.* Rend. Accad. Sci. Fis. Mat. Napoli, 1924, ser. 3, vol. 30, pp. 60–62; Annali R. Osservatorio Vesuviano, 1925, ser. 3, vol. 1 (for 1924), pp. 19–21.

Analysis of the stalactites formed on Vesuvius in 1922 [Abstr., vol. 2, p. 562] gave Cl 7·62, SO_3 48·01, Na_2O 39·20, K_2O 2·45, CaO 0·83, MnO 0·97, CuO 0·18, Al_2O_3 0·05, Fe_2O_3 0·08, insol. in water 0·06, H_2O at 115° 0·31, total, 99·76, corresponding with about 75 % Na_2SO_4 [thenardite].

L. J. S.

Zambonini (Ferruccio). *Sulla presenza del solfato anidro di sodio fra i prodotti dell'attuale attività del Vesuvio.* Annali Osservatorio Vesuviano, 1925, ser. 3, vol. 1 (for 1924), pp. 15–17, 1 fig. [See Abstr., vol. 2, p. 562.]

Zambonini (F.) & Carobbi (G.). *Sulla presenza, tra i prodotti dell'attuale attività del Vesuvio, del composto* $Mn_2K_2(SO_4)_3$. Ibid., pp. 23–25. [See Abstr., vol. 2, p. 382.]

Carobbi (G.). *Ricerche analitiche sulla scheelite di Traversella.* Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1923, ser. 5, vol. 32, sem. 2, pp. 79–83; Gazzetta Chimica Italiana, 1924, vol. 54, pp. 59–64.

Previous analyses of scheelite from Traversella, Piedmont, are quoted. A new detailed analysis made on a yellow crystal gave: WO_3 79·51, MoO_3 0·58, Nb_2O_5 0·08, Ta_2O_5 0·02, CaO 19·57, BaO,SrO traces, MgO 0·05, yttria earths 0·06, Ce_2O_3 0·03, La_2O_3,Nd_2O_3,Pr_4O_7 0·05, H_2O 0·01, total 99·96.

L. J. S.

Kirsch (Gerhard). *Über die Zusammensetzung der Pechblenden.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 223–228.

The amounts of UO_3, UO_2, PbO, ThO_2 shown in published analyses of pitchblende are tabulated; and the ratio UO_2/UO_3 (also of UO_2+

ThO_2/UO_3) is deduced for the original mineral after making allowance for the transformation $2UO_2 \rightarrow PbO + UO_3$. The ratios then range from 11·45 for the purest crystallized mineral from Branchville, Connecticut, to 0·4 for a pitchblende from Australia (1·00 from Joachimsthal). It is suggested that there are here two distinct minerals—one an oxide (UO_2) and the other an oxygen-salt (uranate U_2O_5 or U_3O_8); but that they are now in part represented by 'radioactive transformation pseudomorphs'. For the original cubic oxide the name *ulrichite* is proposed, bröggerite and cleveite being regarded as altered varieties containing thorium and rare-earths. The massive uranate, pitchblende, which sometimes shows nodular surfaces, is cryptocrystalline and perhaps orthorhombic.

L. J. S.

Davis (C. W.). *The composition and age of uranium minerals from Katanga, South Dakota, and Utah.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 201–217.

Detailed analyses are given of: I, pitchblende from Katanga; this is penetrated by a network of various secondary minerals which were dissolved out by HCl. II, uraninite in pegmatite from Ingersoll claim, Black Hills, South Dakota. III, asphaltite in sandstone from Temple Mtn., Emery Co., Utah, containing 92·35 % volatile matter; the figures quoted are of the portion soluble in dilute HNO_3.

	UO_3.	UO_2.	PbO.	ThO_2.	He.	$(Yt,Er)_2O_3$.	$(La,Di)_2O_3$.	CeO_2. &c.	Sp. gr.
I.	37·537	52·77	7·02	nil	0·159	0·35	0·155	0·22	9·660
II.	28·582	48·87	16·42	2·15	0·08	1·01	0·80	0·265	9·182
III.	3·28		0·008	nil	—		0·08		1·456

The Pb/U + Th ratios give as ages 665, 1667, and 20·5 million years respectively; whilst the He/U + Th ratios give 104 (Katanga) and 58·6 (Black Hills) million years. These results are discussed: the former are the more reliable.

L. J. S.

Schoep (Alfred). *Sur la formule chimique de l'uraninite.* Bull. Soc. Chim. Belgique, 1923, vol. 32, pp. 274–281.

The pitchblende from Katanga [Abstr., vol. 2, pp. 182, 342] when treated with hydrochloric acid falls to a black powder, owing to the solution of the intermixed becquerelite. The black residue (sp. gr. 9·787) has the composition UO_2 52·47, UO_3 37·12, PbO 6·91, SiO_2 1·20, Fe_2O_3 0·48, Se 0·72, ThO_2 nil, total '99·01'. This leads to the formula $3UO_2 . 2UO_3$, identical with that of Blomstrand (1884) for cleveite. The UO_3 is, however, due to oxidation, and lead is a product of disintegration

of uranium. The formula of uraninite is UO_2, sometimes with isomorphous replacements of ThO_2; and the mineral is isomorphous with the cubic thorianite (ThO_2, containing some UO_2). L. J. S.

[Labuntzov (A. N.)] Лабунцов (А. Н.). Месторождения урановых соединений в Карельской республике. (Labuncov (A.). *Sur la découverte des gisements d'ouranates dans la Carélie russe.*) Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 113–114.

Uraninite has been discovered in granite-pegmatite veins at two places in the Karelia district in northern Russia. One is at Panfilova waraka on the southern shore of the Chernorechenskaya [i. e. Black river] bay on the White Sea. A pegmatite vein 20 metres thick in a gabbro-pyroxenitic rock contains nests (up to 3 cm.) of uraninite in dark mica, other minerals being oligoclase, microcline-perthite, quartz, and bluish-green apatite. The other locality, 70 km. distant, is on Shar lake. Here the uraninite forms veins, up to $1\frac{1}{2}$ cm. thick, in muscovite, with white oligoclase, tourmaline, quartz, and apatite. Other occurrences will probably be found in the district. P. N. C.

Duffour (A.). *Sur une macle extrêmement rare de la calcite.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 95–101, 2 pls., 1 text-fig.

Three examples of a calcite twin are described on specimens from Rancié, Ariège, from Velmanya, Pyrénées Orientales, and the third probably from Lavalette, Carcassonne, Aude. They consist essentially of the rhombohedra ($77\bar{8}$), ($22\bar{3}$), and ($11\bar{1}$) respectively and are twinned either on ($5\bar{1}\bar{1}$) or (110). The former twin-law is preferred and was first described by Lacroix on calcite from St.-Julien de Valgalgues, Gard. E. D. M.

Friedel (G.). *Sur les macles du quartz.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 79–95, 1 fig.

The author discusses the various types of quartz twin and considers the following as definitely established: Dauphiné ($2\bar{1}\bar{1}$), Brazil, Gardette or Japanese (both types), the 'right-angle twin' of C. Friedel (on artificial quartz only), Esterel, Sardinian [Min. Mag., 1922, vol. 19, p. 295], and 'Breithaupt's twin' ($41\bar{2}$); the hetero-twins are rejected. The rarity of these twins would appear to increase with their index [Abstr., vol. 2, p. 368]. It had been previously found that possible twins may in general be predicted by limiting the obliquity to 6° and the index to 9, a fact amply supported by the twins in question. E. D. M.

Chermette ([A.]). *Sur les associations de la fluorine des Moléras en Saint-Prix-sous-Beuvray (Saône-et-Loire).* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 101–107.

The Moléras mine was once worked for argentiferous galena which is associated with a mineralized quartz vein in tuffs. Fluor, of various colours, both compact and as crystals, is also found in association with the galena and its alteration-products—cerussite, pyromorphite, wulfenite, and prixite; the last a mineral which gives special interest to the locality. E. D. M.

Debeaupuis (—). *Sur un gisement nouveau de graphite français.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 49–53.

Graphite has recently been found in commercial quantities in the south-west of Ouessant Island, Brittany. It occurs as nodules in a granulitic schist, as veins running through gneiss, and also as scales in a mica-schist, and is obviously of contact-metamorphic origin. E. D. M.

Braly (A.). *Sublimés et enduits de quelques chlorures métalliques.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 54–59.

The presence of the chlorides of lead, copper, silver, or mercury in minerals can easily be recognized by volatilization and consequent sublimation by the author's usual methods [Abstr., vol. 1, p. 295]. The results obtained by treating ten such minerals in this way are described. E. D. M.

Arsandaux (H.). *Sur des cristaux déformés de sel gemme, provenant de la mine Sainte-Thérèse à Bolweiller.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 38–42.

Crystals of halite having the appearance of obtuse rhombohedra or oblique prisms occur in a band of clay-slate in sylvine at Bollweiler in Alsace. Although these crystals are quite isotropic and have rectangular cleavage, their distortion can only be ascribed to mechanical deformation. E. D. M.

Gaudefroy (C.). *Dispersion de la biréfringence ($n_g - n_m$) dans la cérusite.* Bull. Soc. Franç. Min., 1923, vol. 46, pp. 34–37, 1 fig.

Examination of basal sections of cerussite from Tsumeb, S.W. Africa, in convergent light showed that the ratio of birefringence to wave-length is a maximum when $\lambda = 620\ \mu\mu$. E. D. M.